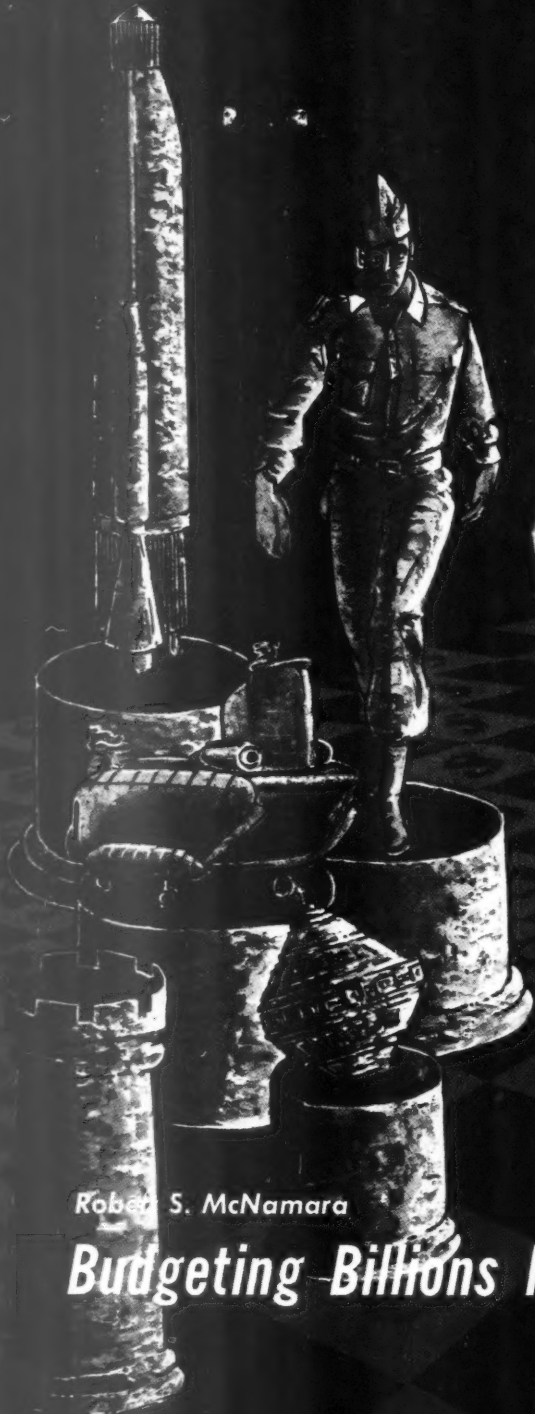


FEBRUARY, 1961

ARMED FORCES

Management

PUBLISHED FOR THE MILITARY SERVICES OF THE FREE WORLD



Robert S. McNamara

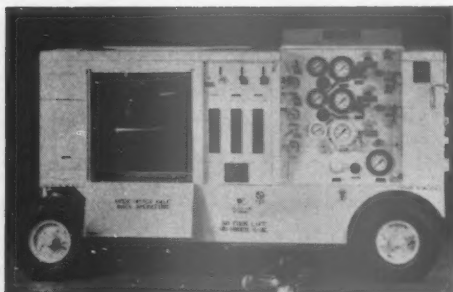
Budgeting Billions For Defense . . . 19

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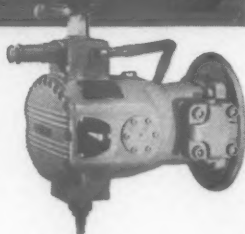
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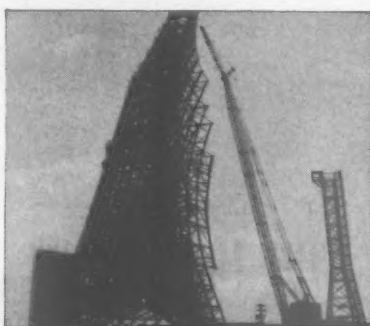
It was guiding Echo I into near-perfect orbit so Bell System scientists could make the world's first telephone call via satellite.



It was developing a world-wide communications system using satellites powered by the Solar Battery, a Bell System invention.



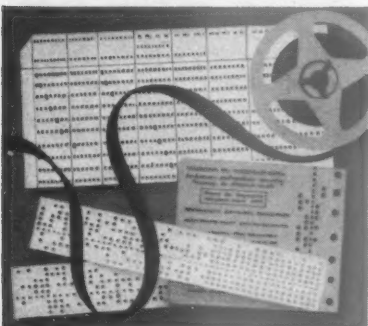
It was offering Bellboy personal signaling to more and more people. Device uses tiny Transistors, another Bell System invention.



It was building fast, reliable communications for BMEWS—the nation's Ballistic Missile Early Warning System.



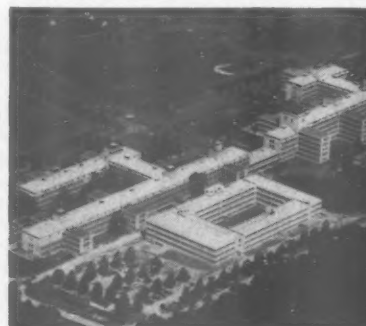
It was constructing a 'round-the-world communications system for America's first man (or woman) into orbit.



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ARMED FORCES MANAGEMENT

ARMED FORCES

Management

PUBLISHED FOR THE MILITARY SERVICES OF THE FREE WORLD

FEBRUARY, 1961

Volume 7—No. 5

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Commander, Air Research and Development Command: What is the man like who turned down a professional golf career to pursue a career in the Air Force? What type of man does it take to start from scratch and build the nation's IRBM-ICBM defense up to what it is today? What type of man does it take to run the Air Force's Air Research and Development Command? The Air Force has the answers to these questions in the person of Lt. Gen. B. A. Schriever.

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This year's Defense Budget has finally reached Congress, but its final form is doubly uncertain. Reasons: New Administration may insist on radical changes and for the first time, Armed Services Committee will make the initial decision on aircraft, missiles and ships.

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FEATURED NEXT MONTH

What European Nations Think of the NATO Alliance . . . The Case For Single Service . . . What's Wrong With Defense-Industry Communications?

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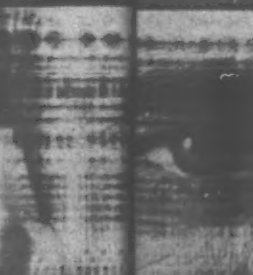
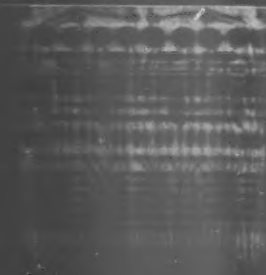
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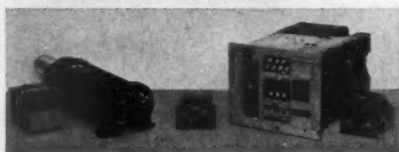
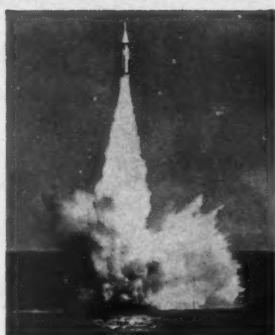
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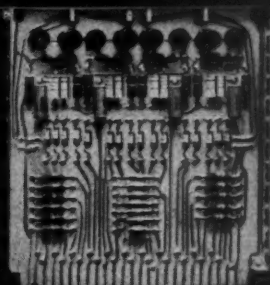


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FEBRUARY 1961

EDITORIAL

The Right To Be Wrong

Part II

ONE OF THE OUTSTANDING military management success stories of the past ten years has been the Polaris development. And it got that way because Adm. Arleigh Burke picked himself a topnotch team, told them they could have whatever resources they needed, and, most significantly, gave them the authority to make mistakes.

The Special Projects team has become the envy of U.S. business management. Its techniques and procedures are being adopted by other key military R&D offices and by defense contractors across the nation in massive proportions. But the real key to this success story, the investment in people, still gets little more than a polite nod in far too many military offices today.

The amazing, and galling, thing about today's defense operations is that military top managers (by delegating the responsibility, then hoarding the authority to approve decisions *in detail*) only encourage their talented people to get out and go elsewhere. Another result: as one general officer put it recently, "It takes three times as long to get anything done in the Pentagon as it does in the field—where you can make a decision and know it will stick."

In the Washington military complex, there is a fairly unique and deadeningly prevalent canard that public servants are supposed to appear infallible. To some extent, this is a carry-over from the military attitude toward command. (For "morale" purposes, the CO is always right—even when he's wrong.) To some extent too, it's probably a reaction to public charges that the military is, by nature, wasteful and inefficient.

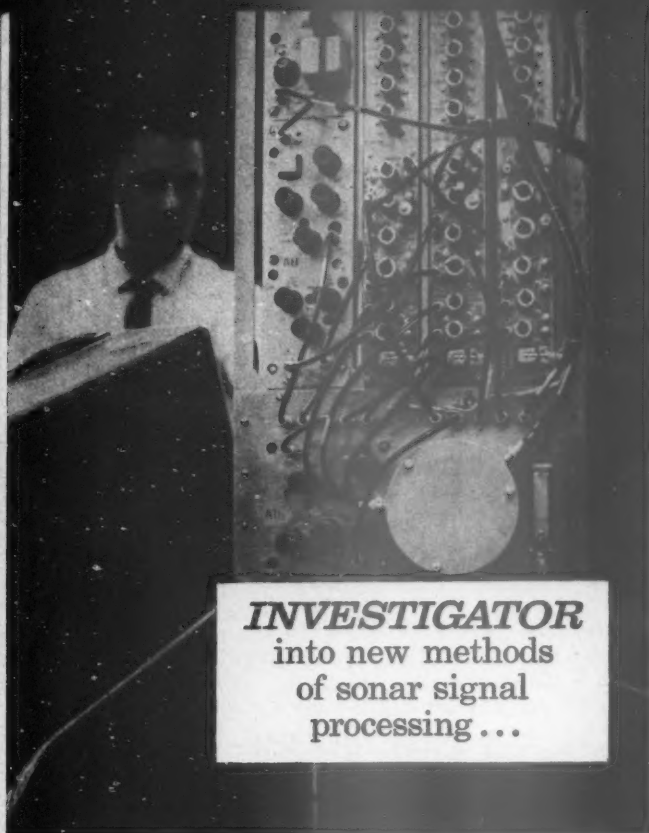
But, mostly it's just an excessively enthusiastic attempt to prevent mistakes. Generals and admirals, ad infinitum, make almost constant pilgrimages to the Washington bottleneck for a nit-pick length accounting of what they intend to do and why—often to lower-ranking officials. Decisions are, in effect, being made by a majority vote of various levels of authority.

The most appalling waste in paying frightened tribute to this buck passing enigma is not money or natural resources—although this waste is appalling enough. The real loss is dissipated manpower.

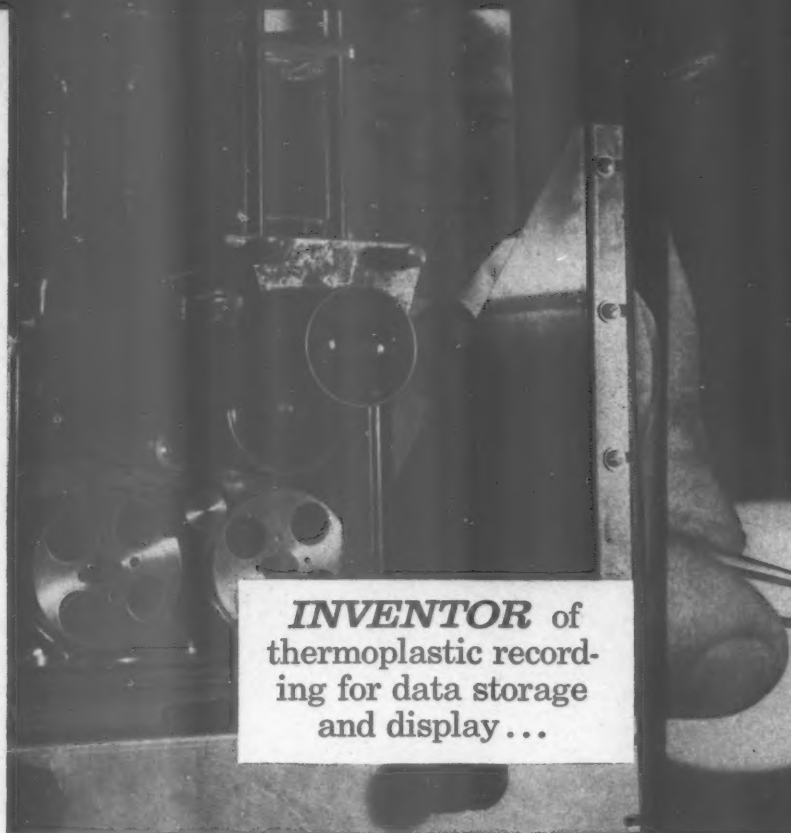
People exposed to the Pentagon very long are usually highly impressed with the wealth of brainpower which works there. Rarely, however, does any of this talent glimmer to the outside. It is swallowed up in a morass of double checking. (The only laughable aspect of all this is that a great many of the mistakes we seek to prevent, even if made, would not cost as much by any standard as we spend to prevent them.)

The fever of Pentagon frustration would ease remarkably if the top men showed enough faith in their second and third echelon executives to delegate them authority—as willingly as they laden them down with responsibility. It seems like such a small thing to ask for, this "right to be wrong." Apparently, it is not.

Bill Borklund



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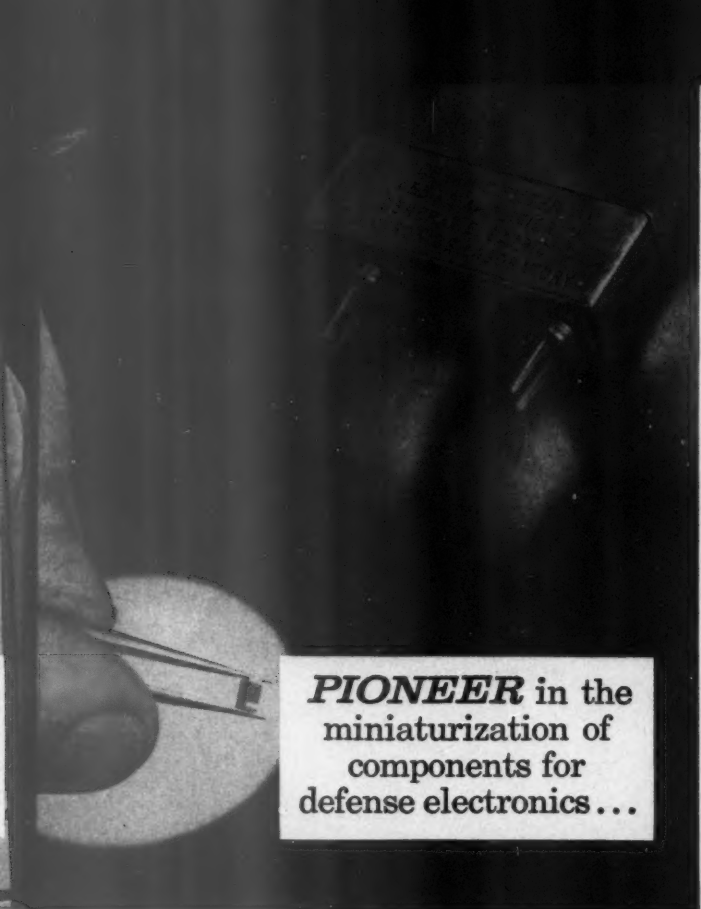
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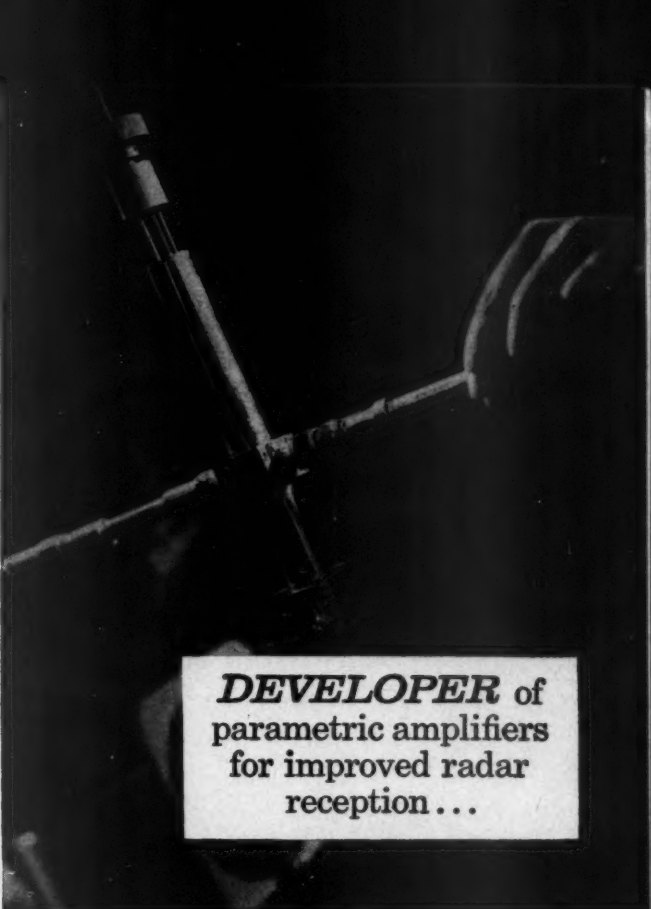
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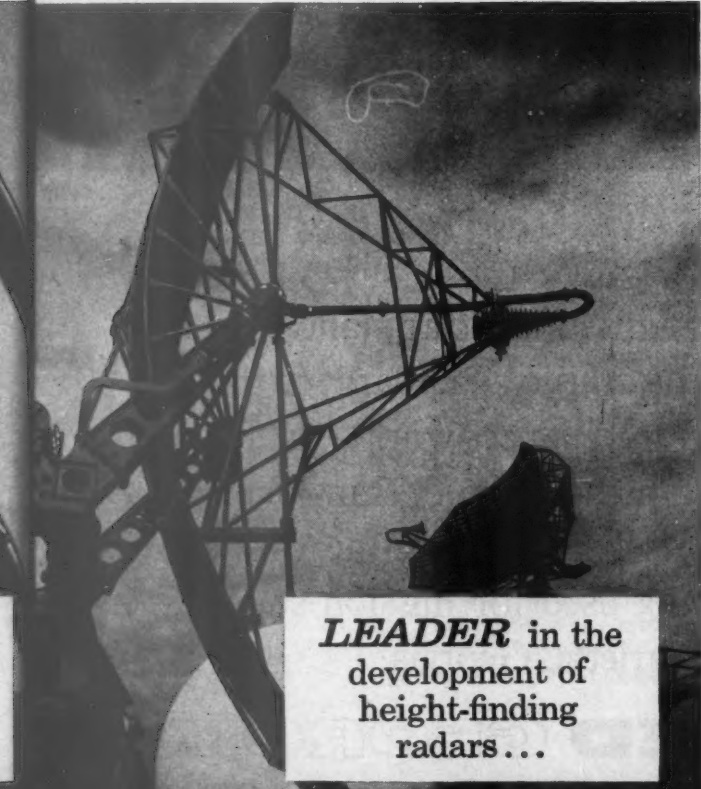
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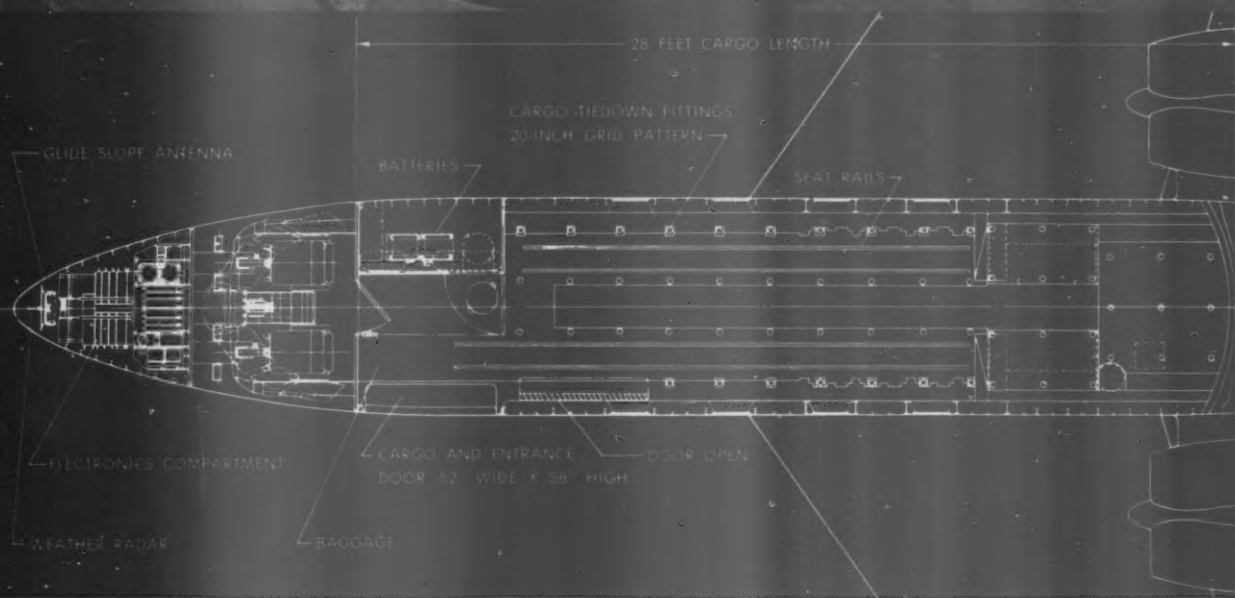
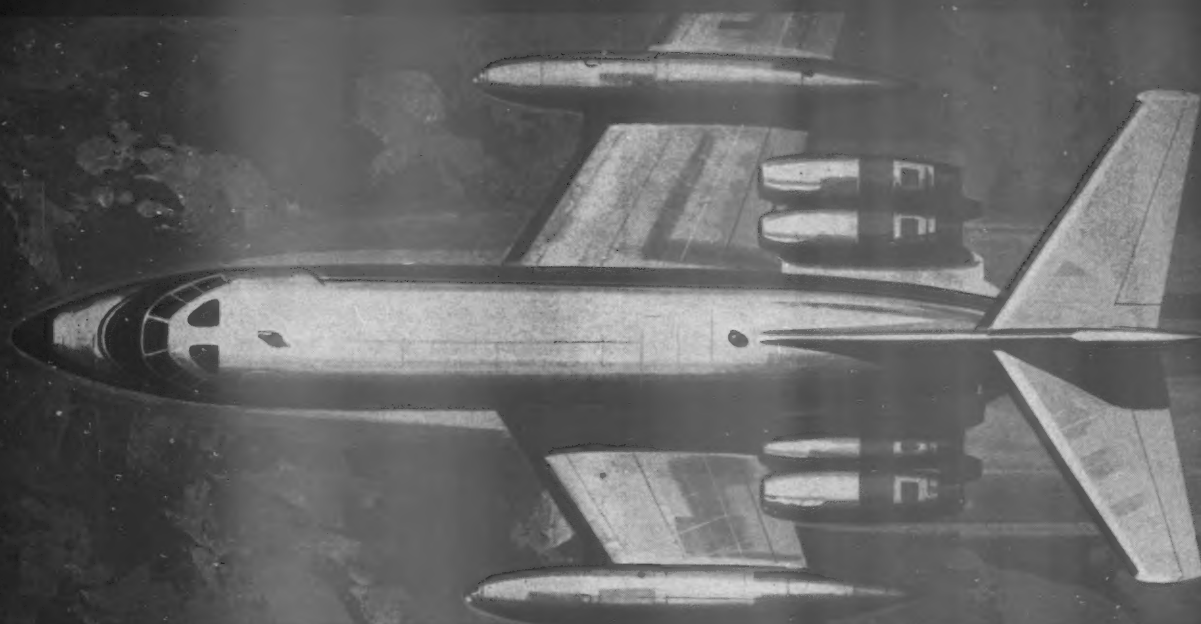
Seven examples of the roles that General Electric's Heavy Military Electronics Department is playing in contributing to U.S. defense strength are illustrated here. Of course, the full spectrum of HMEMD activities is much broader. It includes work in radar, sonar, missile guidance and control, and computers; in data handling, communications, counter measures, and ground warfare; in air defense, missile defense, and product service. 176-10

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Washington Background

Multi-mission Ships: Is Idea's Value Being Questioned?

Some Navy circles are beginning to question again, as they did strongly over 15 years ago, the soundness of current Navy policy that all ships be capable of multi-purpose missions, i.e. missile launch, anti-aircraft, anti-sub, etc.

Although discussions have been strictly informal, unofficial, critics suggest strongly that multi-mission idea actually dilutes capability of ships to perform all missions. They urge greater specialization. Hamstringing any serious proposals: Navy's too-small budget.

Reorganization Issue not Dead

Reorganization debate is not dead by any means, although January press reports inferred that McNamara threw cold water on the whole idea until "sometime in the future."

Actually, both the incoming Defense Secretary and his Deputy, Roswell Gilpatric, are cautious, not because of uncertainty about debate's merits, but for other reasons. Said one general officer, "Before they're even confirmed would be a poor time, wouldn't it, to start raising arguments on controversial subjects?"

Significance: as will be outlined in March AFM story, "Case for the Single Service," great deal of effective reorganization can be done by the Secretary, himself—particularly if "executive reorganization" act (which lapsed in June, '60) is re-enacted.

Management Emphasized

Background of men appointed to top Defense jobs plus President's public statements emphasizing "need for improvement decision making" are strong indications management side of Defense operations will get another strong shot in the arm in 1961. Significance: connecting the words "management" and "military" in one sentence is no longer something done only by nuts.

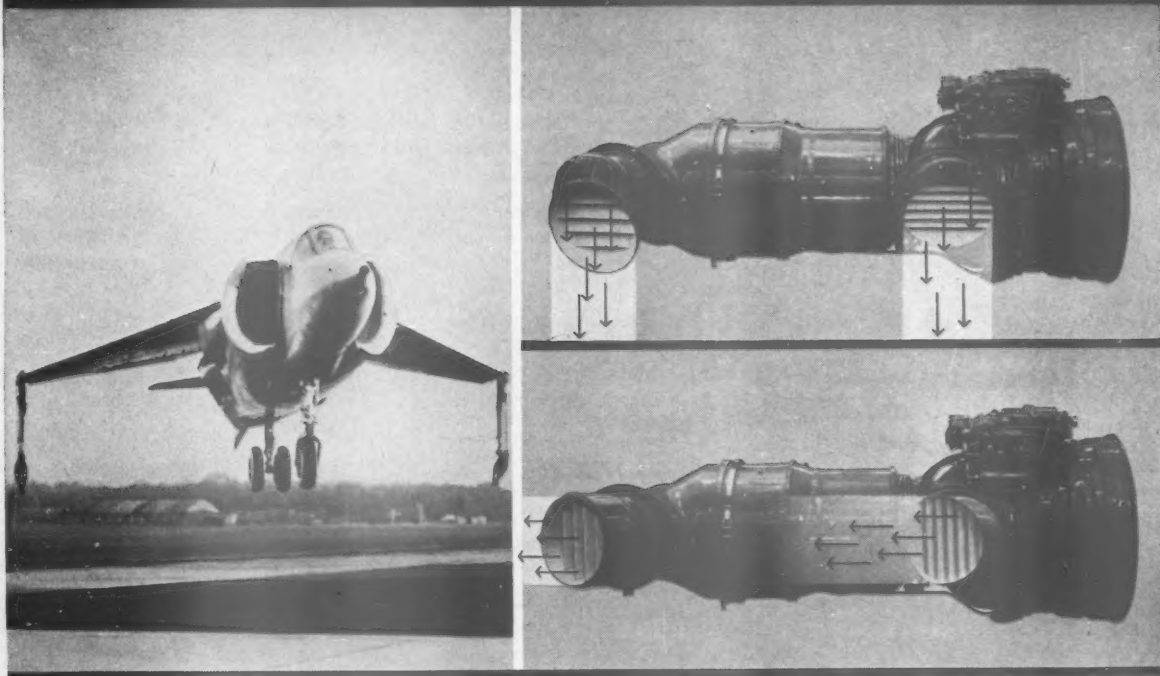
"Citizen" Brucker Will Continue Army Support

Although Wilber M. Brucker has ceased to be Secretary of the Army, he will not stack arms as an Army advocate. On returning to civilian activities in Michigan, the former cabinet member served notice that he intends to speak out for the Army whenever he gets the opportunity. In Mr. Brucker's book, January 20 is not listed as the date he was supposed to quit supporting the Army. Instead, he regards it as an opportunity for additional service. He said that possibly he could do more for the Army "out of uniform" than he could while he was Secretary.

Jurisdiction Over Space Restudied

Overall management of the nation's space programs is one of the areas under particular study by the Kennedy administration's scientific advisory group. Up for reexamination is the line of demarcation drawn to separate space activities with military applications from those deemed predominantly civilian. The subject of space jurisdiction has been controversial ever since the establishment of NASA more than two years ago. Under Eisenhower policy, major military contributions to NASA projects were deemphasized. With most civilian space projects dependent upon military vehicles, service spacemen feel they are entitled to greater recognition.

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Washington Background

BETTER MANAGEMENT STRESSED

In the new Defense administration (starting with the Commander-in-Chief on down through the defense secretaries to the men in the field) it is likely that better management will be stressed with a capital M.

President Kennedy, during his campaign and prior to his inauguration, put emphasize on improving management both in Defense and the rest of the Federal Government. He stressed to each of his major appointees the "need for improved management," directed Budget Director David Bell to draft a "positive and vigorous" program to improve management throughout the entire Federal Service.

In addition, the top Defense Department names read like a Dean's Honor Roll. To name some: McNamara—professorships at Harvard School of Business and experience running mammoth businesses; Gilpatric—expertise in organization; Zuckert—top-notch man in contracts and contract management.

Defense Secretary McNamara has let it be known to all DOD and Service echelons that he wants to hear conflicting ideas and viewpoints on issues of major significance (when in the interest of National Defense). He also let it be known that once an idea has passed the decision stage and reaches implementation stage, he wants no bickering.

Another item: McNamara will follow through with former Defense Secretary Gates' idea of sitting in on JCS meetings and letting the Service Chiefs advise him directly on their viewpoints.

U.S. FORCES ARE NATO TOPIC

One item high on the NATO Council agenda during recent discussions in Paris, was the possibility of a reduction in U.S. forces in Europe. (The council met to review existing military concepts of the Atlantic pact). Outcome, at least for public consumption, is indefinite. Debate will probably continue for some months.

Among the reasons the U.S. is making the request: increased strategic "strike power" provided by U.S. based missiles (and thus, five year old requirement for U.S. conventional forces, claims the U.S., no longer holds); some nations, particularly Germany, are now capable of supplying more support to NATO; and, contrary to political opinion, the outflow of U.S. gold will play a very small part in the decision.

Another item of major significance was the old question of whether a limited war is possible in the NATO area, particularly in the event of hostilities over Berlin. Also discussed was the question of the strategy and tactics to be employed in dealing with possible hostilities in areas just outside existing Atlantic pact defense lines.

Although discussions were in full swing, U.S. representatives were reluctant to make commitments until after the inauguration of President Kennedy.

These four items prompted the discussions:

- (1) The U.S. may find it impossible to maintain existing troop strength abroad because of the loss in dollars.
- (2) The U.S. proposal for a nuclear-armed striking force under direct command of NATO.

(3) Now that the Kennedy Administration is in, increasing pressure for new international disarmament negotiations.

(4) The possibility that France may settle her Algerian crisis this year and bring back to the continent two divisions of troops now in North Africa.

The North Atlantic Treaty Council reviews the allied military concepts regularly; once in Paris where the permanent representatives of the fifteen member nations meet and again in the Military Committee, which meets in Washington.

CHANGES DUE IN AF PROGRAM

Air Force R&D Assistant Secretary, Courtland D. Perkins, has revealed some changes are due in Air Force management of its study requirements program. In the contemplation stage at the moment, goal of changes would be to clear up and/or avoid industry misunderstanding in this area.

Says Perkins, "Although our SR program has been quite successful, there is no question it is misunderstood in some quarters. As a result, there has been considerable criticism. When the Air Force speaks on SR, industry sometimes assumes it is a firm program leading rapidly to hardware. DOD is immediately showered with lobbyists trying to stampede echelons above the Air Force into hasty action."

Actually the SR procedure is only a probing exercise to determine the technical state of the art and its possible applications to military missions. Both government and industry observers have added that the total industry effort tied to SR projects is probably too costly for the value received. "Too many competent technical people may be tied up in studying weapon systems of dubious value," Perkins commented, on the supposition that one of the relatively low-cost studies pre-supposes a much larger industry expenditure.

Among possible Air Force answers: strict limitation of teams participating in SR studies with the possibility that such activities will be confined to efforts paid for by the government; fewer and better stated objectives in future government calls for proposals.

BILL TO AID SMALL BUSINESS

A bill to aid small business through changes in the Renegotiation Act has been introduced by Rep. Abraham Multer (D-N.Y.). The measure would establish a new congressional policy to encourage subcontracting with small business. It would amend the act to give "favorable recognition" to economies achieved through subcontracting with small business firms.

The measure (HR-791) would also exclude from renegotiation "amounts received or accrued from any subcontract awarded to the lowest acceptable bidder as a result of competitive bidding in which three or more responsible competitive bidders have taken part and provided the subcontractor is not owned, controlled, affiliated with or a subsidiary of the contractor." Bona fide competitive subcontracts up to \$1-million with non-affiliated subsidiaries would be exempted. The measure was filed with the Ways and Means Committee.



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In cooperation with the Air Force, Westinghouse Electronics Division at Baltimore has developed a new 3-Dimension radar that can accomplish

this difficult task—the versatile AN/FPS-27.

One radar supplies both search and height data simultaneously. In an automatic system, it can supply real time digital data on an unlimited number of targets.

The AN/FPS-27 and other 3-D radars such as AN/TPS-27 and AN/SPG-59, plus high-discrimination radar techniques such as Phalanx and Synthetic Spectrum, are examples of how the Baltimore divisions of Westinghouse are applying electronic science for Defense. *You can be sure . . . if it's*

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Budgeting Billions For Defense

When economy is the watchword, every Federal agency has to squeeze its budget to fit the framework fashioned by the Administration. The biggest consumer of Federal funds is the Defense Department and the budget squeeze in the Pentagon is proportionate to its financial appetite.

by Paul Conlin

“WE HAVE TO MAKE the foot fit the shoe,” said one of the Pentagon budget men recently. This painful aspect of budget preparation is reflected in all the military departments with varying intensity. For policy reasons, however, the suffering is a privileged matter and its assessment is reserved for the confines of the Defense family. The outsider senses the discomfort, but seldom hears the protesting murmurers.

To the outsider, the \$42.9 billion recommended for Defense (out of a total of \$80.9 billion in expenditures for the entire National Government) might seem rather generous. The 1962 Defense total is the highest proposed outlay since World War II with the exception of 1953 when the Korean War forced the Defense figure up to \$43.7 billion.

What the outsider has no way of knowing is the costs of the goals originally sought—and still sought in many instances—by the Armed Services when they drew up their plans for 1962. He has not been informed of the whittling, pruning, chopping, or near annihilation that the estimates had to undergo as they fought their way up through the Service echelons, braved the scrutiny of the Bureau of the Budget, and eventually won their way into the White House for the President's approval.

This is what the man meant when he said the foot had to be made to fit the shoe.

In line with long established procedures, the 1962 fitting process got under way about a year ago, shortly after the proposed 1961 budget reached Congress. That the fit for 1962 would be snug, to say the least, came as no surprise. The three military services had received through the Secretary of Defense general guidance on what could be done and what funds could be expected. This guidance emanates from the White House and is based on estimates of revenues and expenditures developed in consultations with the Cabinet, the National Security Coun-

cil and the Director of the Bureau of the Budget. As in previous years, the guidance left little doubt that economy was “desired” in the strict military sense of the word.

President Eisenhower reiterated his convictions on this subject in his message transmitting the proposed 1962 budget to Congress.

“The budgetary outlook for the future reinforces the need for self-discipline in meeting current national demands,” he said. “Over the next ten years and beyond, we will be faced with the consequences of many commitments under present law for non-defense expenditures, in addition to the heavy military burden we must continue to bear.”

The original guidance was sufficient to trigger into action the bureaus, divisions, technical services and other agencies of the military departments. By July, preliminary figures from the lower echelons had shaped up to warrant consideration by the budget directors and comptrollers. These initial estimates were based for the most part on known programs and to whatever extent possible on new developments which might mean the procurement of new equipment.

It is in the new areas that the difficulties of the budget estimators are compounded. Where few, if any, experience factors are available, figuring costs becomes increasingly complex. Most new equipment is more expensive because it is more complicated and more technical. It must be anticipated, therefore, that greater technical skills and additional training will be required for maintenance and more money will be necessary for replacements. Thus the calculations spill over from procurement into such categories as personnel, and operations and maintenance.

Unfortunately for the estimator, there are no two years when everything remains constant. The converse is true and the trend is upward. Over the last several years, some calculations show, labor and materials alone have ad-

vanced at the rate of three to five per cent each year.

During the summer and well into the fall, the formulation and gradual consolidation of the budgets of the Services proceeded. The process included presentations, briefings, reviews, analyses, reclammas, additional presentations, and finally full-scale re-examinations with ultimate approval by the comptrollers, the Service secretaries and their military chieftains.

The Next Hurdle

The next hurdle is manned jointly by analysts and examiners for the Office of the Secretary of Defense and the Bureau of the Budget. These specialists have been picking apart military budgets for years and know exactly which areas and what procedures are most vulnerable. In addition, they have been read in previously on most of the problems through field trips to Service installations and shirt-sleeve consultations with Service representatives who know the answers.

The OSD and BOB panels want to know not only What but Why. The What requires details on every aspect of every budget proposal. The Why calls for precise justifications. This exchange, which usually covers a period of about two weeks, also includes compromises, alternatives and other forms of give and take which will be considered before the OSD and BOB decisions are made.

As soon as OSD makes known its verdict, the military move in with re-clammas and rebuttals. More justifications are unlimbered, the needs of the Services are further pleaded and the implications of failure to restore cuts are spelled out. In some instances, the OSD is moved to grant the appeal. In most instances, the decision stands.

With the differences between the Services and the OSD finally resolved, still another vital trial must be faced before the Defense budget is ready. Sitting in final judgment are the Director of the Bureau of the Budget and the members of the National Security Council, including the Secretary of Defense.

This final review covers the budgets of all the executive agencies, but inasmuch as the Defense proposals amount to more than one half of the grand total, they present the greatest number of targets for inquiry. When this review is completed, the entire budget document goes to the President who makes the decision for approval. With the President's signature affixed, the budget is delivered to the printer on Christmas Eve. It emerges in due course from the Government Printing Office, looking like a metropolitan telephone book, and is ready for delivery to Congress.

Whether the foot has been made to fit the shoe and just how snug the fit will be are decisions that Congress will make.

The House Hearings

The budget is now before the House Appropriations Committee and hearings on its Defense chapters are being conducted by the House Subcommittee on Defense Appropriations, headed by Representative George Mahon (D.) of Texas. This year's hearings differ in one important procedural aspect from those of previous years, however. The Appropriations group will have to defer hearings on procurement of missiles, aircraft and ships until the Armed Services Committees have completed action on this important subject, comprising a significant portion of the entire Defense budget.

Part (b) of Section 412 of the Military Construction Act of 1959 requires the enactment of authorization legislation as a condition precedent to the appropriation after December 31, 1960, of funds for the procurement of missiles, aircraft and ships. Under this requirement, the Armed Services Committees will have to prepare a bill sponsored by the Defense Department to authorize such funds as can be justified for this purpose.

Pentagon Debate

The Eisenhower Administration opposed the enactment of Section 412 (b) and in his budget message President Eisenhower called for its repeal. "The provision of Section 412 (b) of the Military Construction Act of 1959 requiring prior congressional authorization of appropriations for the procurement of aircraft, missiles, and naval vessels is inappropriate and should be repealed," he said. "Pending its repeal, the required authorizations for 1962 should be enacted promptly so that national security planning and preparations can go forward with the least possible delay. Further, in enacting the authorizations, the Congress should allow flexibility in the administration of the Department of Defense procurement programs to meet changing threats and take advantage of technological breakthroughs."

In discussing Section 412 (b), one Pentagon budget authority said it was motivated by the Congressional belief that the Appropriations Committees had assumed some of the prerogatives of the Armed Services Committees. He further described the section as a device to assure that the will of Congress can be expressed adequately on Defense programs when the political complexion of the Executive differs from that of the Legislative Branch. This difference does not exist under the new administration, he pointed out, and the value of Section 412 (b) might well be questioned.

Discussions on the bill required by Section 412 (b) have been held in the Defense Department, but if decisions have been made they have not been disclosed. It appears likely that the language and substance of the proposed legislation will be guided by the policies and actions of the new administration.

As of now, however, the Defense Department is reported to be opposed to the use of the line-item system of listing specifics in satisfying the requirements of Section 412 (b). The line-item system, Defense reasons, would be unduly restrictive, if not a virtual straight jacket, in the procurement of missiles, aircraft and ships.

Case History on the Unpredictable

Each year, every item in the Defense budget is subject to reviews, re-studies, revisions and readjustments. Typical of what can happen is this chronicle of last year's budget actions on the BOMARC project of the Air Force:

	(Millions of Dollars)	
	FY '60	FY '61
President's Budget (original)	377.3	421.5
"Air Defense Reorientation" Revision	-5.5	-381.1
President's Budget (revised)	371.8	40.4
House Action	-253.6	-40.4
House Bill	118.2	0.0
Senate Restoration	+253.6	+115.4
Senate Bill	371.8	115.4
Conference Action	-21.0	-104.0
Appropriated	350.8	11.4

The preference of the Defense representatives is for the authorization of definite dollar sums on a one-line basis for each of the Services, Army, Navy and Air Force. Whether the new administration is in agreement remains to be seen.

There is no doubt where the Eisenhower administration stood on this question. The appropriation of funds on a broad category basis with specific limitations by Service was adopted in connection with the Defense Department reorganization plan of 1958. In his 1962 budget message, the President said the method of providing funds for Defense still needs attention.

"I now recommend," he stated, "that the Congress, in acting upon the appropriation structure for the Fiscal Year 1962 for the Department of Defense, give earnest consideration to a plan which would make the necessary authorizations and appropriations to that Department to be administered by the Secretary, but with a substructure of sufficient identification which will retain for the Congress its constitutional prerogatives of raising and supporting the military forces of the United States."

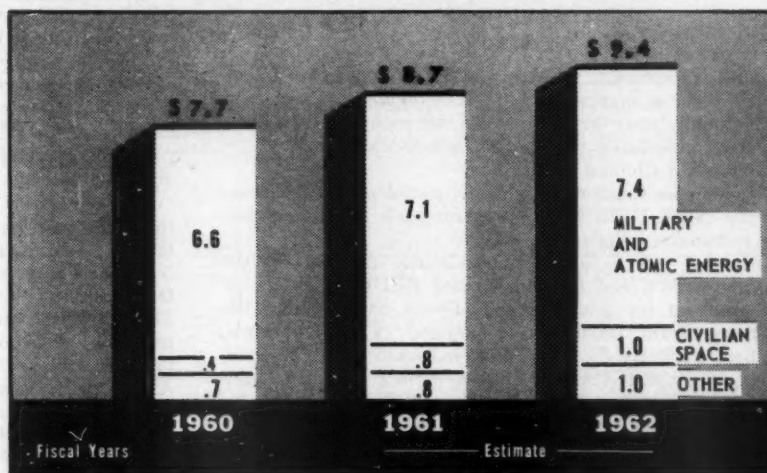
If the attitudes of the Armed Services Committees are the same as those of the Appropriations Committees regarding the one-line or broad category basis as opposed to the line-item system, such a proposal might get a favorable reception in the Senate group. In the House, on the other hand, something less than enthusiasm might be expected.

Line-item System

During hearings on the budgets for the past several years, the record shows, there has been an increasing tendency on the part of the House committees to insist on detailed, itemized information. Should this trend persist, one budget authority contends, it will be tantamount to resuming the presentation of the budget on a line-item basis in substance if not in form.

The line-item system became effective in 1922. It was constructed along organizational lines with funds appropriated in segments for agencies such as the technical services in the Army and the bureaus and Marine Corps in the Navy. To estimate the costs of particular programs under this system, it was necessary to assemble data piecemeal from numerous individual budgets. This practice was challenged by the Hoover Commission on Budgeting and Accounting. The commission report recommended as a substitute that budget emphasis be placed on functions and on the costs of their performance. In line with the report of

How R&D Breaks Down: In Billions



the Hoover group, Public Law 216 and the National Security Act amendments of 1949 prescribed the adoption of the functional type budget and classified all budget requirements by activities such as Research and Development, Military Personnel, and Procurement of Equipment.

The principal concern of the Service representatives in evaluating the line-item tendency appears to be the mass of details involved in the system and the amount of time which would be required in defense of them. One of the budget men summed it up this way:

"During the war the budget was four feet tall on a line-item basis. Under the new system it's one foot high. The trend is toward a return to the line-item system where in one instance it took 128 pages to describe one of the procurement items. We could do a better job by selling the budget on missions and objectives instead of on rents, travel, rebuild, postage stamps and paper clips. We are dealing with a budget in the billions and we can account for our stewardship satisfactorily."

A Period of Grace

Whether the required authorizations for 1962 can be "enacted promptly," as advocated in the Eisenhower budget message, appears to be a question of definition in the Pentagon. In the interests of national security, it is evident that the military planners cannot afford a pause in their activities during the period of administrative turnover. The new administration is already deep in its studies of Defense requirements, but some observers estimate that at least "a couple of months as a period

of grace" may be required before definitive courses of action are determined.

The Wrap-up

That there will be some changes in the 1962 budget is a foregone conclusion although the latitude of the areas subject to change is limited. More than one-half of the budget is for overhead "to keep the store open," they estimate, and about two-thirds of the remainder is earmarked for programs which have been under way for the past one or two years. If the new administration decides that the Defense budget must be revised substantially, the prompt enactment of the required authorizations will become increasingly difficult and will be governed by the pace of the legislative vehicles.

In this connection, it is reported that consideration may be given to the possibility of simultaneous hearings on Defense budget proposals by the House and Senate Appropriations Subcommittees. Under existing procedures, Defense spokesmen first present their budget justifications to the House Appropriations group. Subsequently, the Defense witnesses must repeat their presentations before the Senate Appropriations Subcommittee. If the hearings before the two groups could be telescoped, advocates of the proposal contend, the authorization process would be accelerated substantially.

As the budget process now stands, the Defense Department has done its best to make the foot fit the shoe fashioned by the last administration. If there are any complaints, they will be muffled even though the new administration favors footwear of a different style.

Hardware Highlights:

Army

FOR procurement, the Army is slated to get \$1.6 billion in 1962 as compared with \$1.3 billion in 1961. This will include funds for 261 new aircraft such as the Mohawk combat surveillance plane, the Caribou transport, and the Iriquois and Chinook helicopters.

Air defense funds will "generally complete" the financing of the NIKE-HERCULES program with major emphasis on system improvements.

Missiles will include a "considerable number" of the mobile HAWK and the man-carried REDEYE surface-to-air weapons for ground forces. Funds will provide "the first significant production quantities" of the solid-fuel, tactical PERSHING for operational units. A "significant number" of SERGEANT surface-to-surface tactical missiles will be bought for field Army use. Planned programs for improved versions of HONEST JOHN and LITTLE JOHN will be "largely completed." Other items include a third increment of the DAVY CROCKETT, the man-carried nuclear rocket, and improved guided antitank missiles (not further identified).

For increase of "Army modernization, generally, and divisional mobility and firepower, in particular," continued procurement of "substantial numbers" of M-60 tanks, M-113 aluminum armored personnel carriers, M-88 tank recovery vehicles, new self-propelled, air-transportable 105 mm., 155 mm., and 8 inch artillery, tactical trucks, and a new self-propelled, air-transportable mortar; also a new armored full-track wrecker and a new heavy equipment transporter; atomic, chemical, and antipersonnel munitions for use by tactical forces.

Communications and electronics: surveillance and navigational equipment for Army aircraft, additional short en-

durance combat surveillance drone systems, test purchase of USD-5 long endurance combat surveillance drone systems, modernization and replacement of combat radio, telephone and teletype communications and control equipment, continuing improvement of Missile Master system.

Logistics: initial procurement of new mobile nuclear power plant for remote combat areas, generators for missile and radar sites, airfield and road building equipment, construction and materials handling equipment, Conex containers, rolling fluid transporters, amphibious lighters and rough terrain forklift trucks.

In the research, development, test and evaluation area, the Army will get \$1.1 billion for 1962 as against \$1 billion last year. Outstanding item will be \$250 million for NIKE-ZEUS development culminating in "full-scale system tests" in the summer of 1962. This brings NIKE-ZEUS funds to more than \$1 billion since inception of program. "Substantial funds" will go also for development of PERSHING, and work will proceed on "Missile A" for battle group support, and on MAULER, surface-to-air missile for air defense. Emphasis will be placed on SHILLELAGH, short range weapons system mounted on combat vehicle for use against personnel and tanks. Other research projects are DAVY CROCKETT, airborne assault vehicles, biological and chemical warfare techniques such as nonlethal chemical and biological agents, and neurosensory phenomena, and strategic and tactical control and communications systems.

Navy

Navy procurement for 1962 is scheduled for \$4.5 billion compared with \$4.3 billion in 1961. This will provide for 644 aircraft for the Navy and Marine Corps including new A2F low level attack aircraft, A4D's, supersonic fighters, all-weather F4H-1's, and a variety of short and long range anti-submarine warfare patrol aircraft and four models of helicopters.

Department of Defense

New Obligational Authority, Direct Obligations and Expenditures

Fiscal Years 1960-1962

(Millions of Dollars)

	New Obligation Authority			Direct Obligations			Expenditures		
	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962
Military Functions									
Military Personnel	12,026	12,221	12,416	11,934	12,196	12,416	11,738	12,142	12,390
Active Forces	10,637	10,770	10,879	10,582	10,761	10,879	10,390	10,708	10,850
Reserve Forces	674	677	611	659	660	611	654	660	614
Retired Pay	715	775	926	693	775	926	694	775	926
Operation and Maintenance	10,317	10,714	10,842	10,243	10,728	10,842	10,223	10,400	10,671
Procurement	13,105	13,453	13,378	12,732	15,133	14,641	14,312	13,753	14,372
Aircraft	4,124	5,293	4,894	5,397	6,655	5,634	4,467	5,896	6,095
Missiles	3,240	3,520	3,816	3,474	3,898	3,971	3,790	3,898	4,005
Ships	1,140	2,246	1,825	1,473	1,866	2,074	1,744	1,674	1,695
Other	2,602	2,394	2,841	2,389	2,714	2,961	2,292	2,284	2,576
Research, Development, Test, and Evaluation	4,216	4,261	4,349	3,967	4,667	4,345	3,732	4,148	4,388
Military Construction	1,364	995	985	1,350	1,327	1,159	1,626	1,368	1,327
Active Forces	1,291	939	935	1,294	1,260	1,095	1,569	1,308	1,263
Reserve Forces	73	55	50	56	67	64	56	60	64
Revolving and Management Funds	30	30	20				-416	-312	-238
Sub-total	41,058	41,674	41,990	40,225	44,051	43,423	41,215	41,500	42,910
Available by transfer of prior year balances	-430	-344	-150						
Total, Military Functions	40,628	41,330	41,840	40,225	44,051	43,423	41,215	41,500	42,910
Military Assistance	1,331	1,800	1,800	1,605	1,896	1,875	1,609	1,700	1,750
GRAND TOTAL, DOD-Military (Military Functions and Military Assistance)	41,959	43,130	43,640	41,831	45,946	45,297	42,824	43,200	44,660

NOTE: Data are adjusted to reflect comparability with FY 1962 appropriation structure.
* New obligational availability, including transfers of prior year balances.

Department of Defense
New Obligational Authority, Direct Obligations and Expenditures
Fiscal Years 1960-1962
(Millions of Dollars)

	New Obligational Authority			Direct Obligations			Expenditures		
	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962	FY 1960	FY 1961	FY 1962
Department of the Army	9,970	10,130	10,530	9,847	10,379	10,594	9,392	9,615	10,073
Department of the Navy	11,369	12,460	12,237	11,727	12,579	12,802	11,642	11,745	12,078
Department of the Air Force	18,546	17,895	17,881	17,662	19,831	18,706	19,168	18,897	19,344
Office of the Secretary of Defense	1,173	1,189	1,341	959	1,262	1,321	1,013	1,223	1,415
Sub-total	41,058	41,674	41,990	40,225	44,051	43,423	41,215	41,500	42,910
Available by transfer of prior year balances	-430	-366	-150						
Army	-281	-260	-125						
Navy	-99	-76	-						
Air Force	-50	-30	-25						
Total, Military Functions	40,628	41,308	41,840	40,225	44,051	43,423	41,215	41,500	42,910
Military Assistance	1,331	1,800	1,800	1,605	1,896	1,875	1,609	1,700	1,750
GRAND TOTAL, DOD-Military (Military Functions and Military Assistance)	41,959	43,108	43,640	41,831	45,946	45,297	42,824	43,200	44,660

NOTE: Includes estimates proposed for later transmission as follows: FY 1961, \$289 million; and FY 1962, \$31 million.

Four ballistic-missile-firing submarines will be added to the POLARIS force. This will bring to nine the total number of POLARIS submarines commissioned by the end of 1962.

Procurement funds for the POLARIS system will be about level with the 1961 program. It is reported that the POLARIS total will account for about 11 per cent of the entire 1962 procurement figure for the Navy. Allowing for the difference in lead time, POLARIS missiles will be purchased in phase with the five submarines planned for construction in 1962.

A total of 52 ships, 30 new construction and 22 conversions, are provided at a cost of \$1.9 billion. These include seven guided missile frigates, three nuclear-powered attack submarines, six escort ships of which three are guided missile type, one amphibious assault ship, two amphibious transports (dock), one combat store ship, one fast combat support ship, three oceanographic research and survey ships, and one hydrofoil research ship. Another 14 World War II type destroyers will get major modernization; six conventionally powered attack submarines and two other ships will undergo major conversion. Another increment of five POLARIS submarines will increase to 19 the number of POLARIS fully funded in 1962 and prior years. Advance procurement of long leadtime components for an additional five POLARIS submarines is also provided.

The Navy's R,D,T&E funds for 1962 will total \$1.3 billion, a slight decrease from the 1961 figure. Items include: further development of the POLARIS and its longer range A-3 version, further development of the BULLPUP missile, and "a large and diversified" schedule on anti-submarine warfare, including surveillance systems and the SUBROC ASW weapon. New ships will be commissioned with ASW capability, and others will be modernized with ASW equipment. Still others will be equipped with SONAR, the ASROC torpedo, and homing torpedoes. Available for the fleet will be new HS-2 all-weather ASW helicopters and the S2F-3 carrier-based ASW aircraft.

Modern ships received from new construction will include the first nuclear-powered aircraft carrier, ENTERPRISE, the first nuclear-powered cruiser, LONG BEACH, armed with TALOS and TERRIER missiles, and several new guided missile destroyer types.

Marine Corps strength will remain unchanged and low personnel turnover and improved personnel management will permit restoration of all cadre battalion landing teams by early 1962. Marine amphibious capabilities will be improved by commissioning four new ships designed for beachhead operations and carrying helicopters and landing craft. Modernization includes 7.62 mm. weapons, the RED-EYE missile, improved tracked landing vehicle for clearing mines, and improved ammunition for mortars, field artillery and antitank weapons.

Marine aviation will get more ZUNI rockets, low drag firebombs, A4D aircraft, the F4H all-weather interceptor, additional transport helicopters, and a second inflight air-refueling squadron.

Air Force

Air Force procurement will total \$8.2 for 1962 as against \$8.1 for 1961. Development work on the B-70 Mach 3 intercontinental bomber will proceed with the first flight test scheduled for 1963. No additional appropriations for the B-52 and B-58 are requested. The F-105 all-weather fighter bomber will be purchased in a "substantial number." An accelerated program is planned for the development of the new long range cargo transport for the Military Air Transport Service. More than 200 T-38, T-39 and T-40 jet aircraft will be added for training and support.

The Air Force will continue to have a capability of placing one-eighth of the heavy bomber fleet on continuous airborne alert. Several more ATLAS and the first TITAN ICBM units will become operational. For warning against ICBM attack, the second of three long range warning sites of the BMEWS will become operational. Ability of heavy bombers to penetrate enemy defenses will be improved by latest electronic countermeasure equipment, QUAIL decoy missiles and HOUND DOG air-to-surface missiles.

Air Force tactical forces will be modernized by replacement of F-100 aircraft with F-105's and by the improved MACE B missile. The F-105's are scheduled for overseas and the United States. The tactical missiles will go to Europe and to the Pacific area. Air defense forces will be improved by modification of F-101, F-102, and F-106 aircraft and by increased operational availability of BOMARC.

Air Force R,D,T&E will total \$1.6 billion for 1962 against \$1.3 billion for last year.

Seven Reasons For Raborn's Success

By C. W. Borklund

Without insistence from the top, one of the Polaris' team's best contributions to Defense will be lost. On the facing page is the key element. What made it work is outlined below. . . .

BACK in December, 1958, ARMED FORCES MANAGEMENT had the audacity to run an article dealing with a top notch management control team.

The article was titled "Why Polaris is Winning its Race Against Time"—which was then an apparently ridiculous contention. (Three Polaris missiles had just blown up on or around the launch pad and the Washington wolves, smelling the possibility of extra dollars becoming available for other things, were calling the whole effort risky, at best.)

It turned out, of course, that Special Projects knew what it was talking about. But all the signs indicate that one of SP's most significant contributions, potentially, may be lost in a welter of inattention.

The contribution: how to turn simple management dogma from casual conversation into rewarding procedures, whack the daylights out of leadtime and turn complex projects into operational hardware in a hurry. Said one general officer (not Navy): "Some expert should prepare a textbook on the whole effort—and the Secretary of Defense should make it required study, on penalty of imprisonment, for everyone in the Pentagon."

Not entirely unheard of in Russia, that contention may be a little impractical in a democracy. But the point, for project officers and their superiors: Special Projects did unearth and/or re-discover a lot of techniques, through their management operations, that were (and still are, say some disgruntled military executives) being generally overlooked.

Few people seemed to realize, in 1958, (and apparently not many more realize today) how quickly the problems of the Space Age have moved from the laboratories and equation-covered blackboards into the executive and legislative offices of government.

Nor do enough accept, evidently, the argument that how well we succeed in this defense effort will be a direct result of how well it is run—in spite of the fact that our best efforts to date have been on those programs which have measured up to just exactly that demand.

Says Pehrson, "I remember when Buck Rogers and I spent part of Sunday morning on the living room floor. We had a clear understanding that this sort of thing was not supposed to happen until the next century. Yet, today, the theme "Management in the Space Age," is a proper and completely meaningful framework within which to hold

thoughtful and wide-ranging discussions on the opportunities and necessities for re-examining the Defense Management system."

And, boasts, Nikita Khrushchev, "Our System has permitted us not only to beat the United States (in hardware) but to surpass it in science and technology." In its final analysis, the contest is as fundamental as that.

What are some of the lessons to be learned from SP? Dissected and scrutinized with microscopic fervor, they could run into the hundred of cases.* The major chapter headings don't run quite so high. Among them:

I—PERT

Developed under the direction of Raborn's management expert, Gordon O. Pehrson, (see p. 26, "No Anonymous People"), PERT is picking up a host of disciples in the military and throughout industry.

PERT does what, until now, most of the experts considered impossible—schedules research and development with production line exactness, allowing for a "slight" gambler's hedge on probabilities. More specifically using a computer for the calculations, PERT permits day-to-day display, (even hour-to-hour if necessary) in terms management can understand, if the development and production events most likely demand urgent attention now and in the future. Further, it can show the effect on one event that a lag or speedup on another will have.

Raborn credits PERT, plus complete fiscal responsibility for the project, with being the main reason for Polaris' years-ahead success, adds that PERT enabled methodical motivation for all project personnel because it permitted immediate, up-to-date management surveillance.

Other than PERT, how much the SP office is doing that is really new is debatable. Point is, they are *doing*, not just talking. Among the dusted off management dogma:

II—Authority

Early in the game, Navy realized, to save time, they'd have to set up an organization which could end-run the one big organizational problem still not solved, as a general rule, in Defense operation.

The roadblock: rarely is there an opportunity for military departments to show the inter-relationships of a total project effort. There are too many divisive influences (R&D, Supply, Procure-

(Continued on page 33)

ARMED FORCES MANAGEMENT



Left: VADM Wm. F. Raborn, Jr., who ran the show.

Center: RADM J. B. Colwell, his first deputy.

Right: CAPT Levering Smith, the technical expert.



The Key Point: "There Are No Anonymous People"



EARLY in Special Projects' formative months (late '55-early '56), Raborn laid down what has been called the most important plank in SP's platform, has never missed an opportunity since to emphasize it.

It became the base on which nearly all the rest of SP's program control procedures turned. The plank, in effect, "Above all, remember the program will be run by people. We must find the best talent we can find, then give them all the elbow room they need to carry out their responsibilities.

"And they must each have a clear understanding of why their job is important and where it fits in the project. There will be no anonymous people." Not a brilliantly new idea, (it can be found in just about any good management textbook), what made it unique, say his backers, is that Raborn practiced what most of the Pentagon only preaches.

Navy CNO Arleigh Burke, set the authority-with-responsibility pattern when he created the office in the first place. Burke gave Raborn his now famous "hunting license" (for men, money and materials), then refused to budge off that position of faith—even in the dark days of '58-'59 when attempted Polaris missile shots were blowing up like Roman candles on the Fourth of July and Washington's "experts" were demanding Raborn's head. Burke's only admonition: "if at any time you think it isn't going to work, let me know immediately and we'll kill it."

That Burke's ultimate belief in investing in people* paid off admirably is a matter of history now. But, beyond Raborn, who these people are is not generally known.

*See "No Better Than The Men Who Man It," Nov., '60, AFM.

Navy's Quarterbacks:

And short of preparing a Navy-register-sized treatise, there is no fair way to single out all the talent that deserves singling out. Touching just the very top:

Vice Adm. Wm. F. Raborn, Jr.—55, Texas-born, Raborn was in Hawaii when the Japanese hit Pearl Harbor, spent the next 14 years acquiring medals, campaign and commendation ribbons and a strong command background (pilot, ship commander, operations officer, task force chief of staff), was Atlantic Fleet assistant chief of staff for operations in December, 1955, when Burke ordered him to set up and run the Polaris project.

Says one SP staff man, "I don't think too much can be said for Raborn. A fascinating combination of talents, he is, on top of everything else, a terrific salesman. After the technical feasibility of Polaris was established, he personally sold the program all over Washington."

But if Raborn's ability at sales-diplomacy (and almost clairvoyant knowledge of when to use it is) impressive, so are his driving, whip cracking, firefighting talents as coach of the team. His penchant for "twisting the tiger's tail"—a favorite expression—finally prompted General Electric in good-natured exasperation, to present him with an authentic Siberian tiger's tail complete with whip handle. And his continual use of the long distance wires has made him one of Bell Telephone's best customers.

Rear Adm. John B. Colwell—Raborn's first deputy director is an Annapolis graduate ('31) and top flight Navy ordnance specialist. With "Bull" Halsey in the Pacific during most of World War II, Colwell (51) has spent the better part of his career since in key jobs around Washington. A reputation for being particularly good at tracking down people made Colwell first choice to build a staff, find them



Geckler



Moore



Shugg



Burriss



Hagen



Peterson



Root

a place to work. Beyond that, he ran the office when Raborn was out selling the Polaris concept or prodding contractors—which was often. Promotion in early 1958 to rear admiral forced him to leave what Colwell terms, "One of the most fascinating and rewarding two years of my life."

Capt. Levering Smith—Called by Raborn, the "best scientist in uniform today," 50-year-old Levering Smith is one of the nation's pioneers in solid propellant fuel, is relied on heavily for technical judgments. As head of the "brain trust" batch of top U.S. scientific experts (official name: Polaris Steering Task Group) who spent three months "devising the Polaris system's parameters," he laid down the original technical development plan. (Plan was so solid only one major change had to be made later—when ultimate range requirement was upped from 1500 to 2500 miles.)

Background and familiarity with technical problems of "taking missiles to sea" made him the logical choice for technical director—as Aerojet General president Dan Kimball, among others, so recommended. Mark of Raborn's respect: Smith is one of the few men allowed to talk beyond the 8-minute time limit during weekly briefings in the Program Countdown Room.

Gordon O. Pehrson—the man who created and built Raborn's management machinery, super grade civil servant Pehrson has a reputation for management savvy unexcelled in Defense circles. So many different varieties of bonquet-sized adjectives have been heaped on his government career, that admirers have quit trying to come up with new ones, prefer to fall back on the generality: "Everything that's been said about him is true."

While most military managers today display these controls with pride, Pehrson considers these first devices (line-of-balance, milestone charts) "pretty crude stuff." Pride and joy: the Program Evaluation and Review Technique which Raborn gives major credit for Polaris' years-ahead success and industry has called "the greatest management breakthrough in 10 years." Now plans and programs boss for BuWeps, Pehrson says of the technique: "At the very least, companies using PERT must become more deliberate liars."

The Rest of the Team

With over 2000 contractors, stretching from coast to coast, SP had a monumental communications problem—and received an even more monumental support. More, in most cases, because of the company contribution they represent, than for any herculean individual efforts, here are some of the headliners:

Ships

Whole Polaris timetable was geared to estimated development time for the submarine, today's George Washington. Added pressure: Raborn wanted the submarine in three years—about the same time required for conventional nuclear boats on which all the building bugs have been worked out. General Dynamics' Electric Boat Div.,

got the nod, gambled to save time by (1) buying \$3-million worth of steel before they had a contract to build; (2) cutting an already-under-construction nuclear sub in two, sticking the 130-ft. missile carrying section in—and delivered.

They felt pressure from both Raborn and Navy nuclear energy expert Hyman Rickover who "pervaded the very clear understanding that Raborn's timetable was not going to be upset under any circumstances because we couldn't get him a boat on time."

Top man on the project: 61-year-old Carleton Shugg, Electric Boat general manager and a General Dynamics senior vice president. A 1920 Naval Academy graduate, Shugg received a master's degree in naval construction from M.I.T. four years later. His master's thesis: submarine construction. He left the Navy in 1929 to work for a Massachusetts electrical firm, went into shipbuilding during World War II, has been there ever since—except for a tour as Atomic Energy Commission deputy general manager. (His Polaris project officer was an engineer just slightly over half his age. Says Shugg, "Age wasn't that important. Ability was—and is.")

Launcher

Besides supplying the ship nuclear reactor, Westinghouse was prime on the missile launcher. Launcher problem hovered in a grey technical area between (1) putting enough push behind the missile to get it out of the water before its engine fired (repercussion would hit sub like a depth charge if fired under water) and (2) not so much pressure that pop up would damage delicate missile parts.

Set back, temporarily, when talented first project manager, Dr. W. "Butch" Brandt, died of a heart attack in 1957, Westinghouse appointed electrical engineer James S. Hagan to manage Sunnyvale division and find the answer. Brandt's replacement had spent 12 years as a Westinghouse midwest regional manager in Chicago, ran a team which fought through monumental frustrations which looked, for a while, like they might rule out the most logical, and final, answer—the compressed air, pop up idea. Hagan has since moved up a notch, is assistant to the vice president, for apparatus products, still headquarters in Sunnyvale.

Missile

Driving force behind the whole missile development has been Lockheed Aircraft's Missiles and Electronics division and its group vice president, E. Eugene Root.

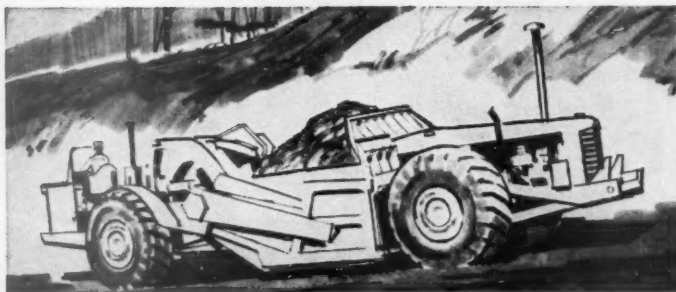
Vice president and general manager of the Missiles and Space division when the Polaris development began, Root moved to his present job in 1959. Holder of Aeronautical and Mechanical Engineering, Engineering, Mathematics degrees, he has worked for Lockheed seven years, held key jobs with The Rand Corp. and Douglas Aircraft before that.

Man carrying the project burden: Stan W. Burriss,

(Continued on page 36)

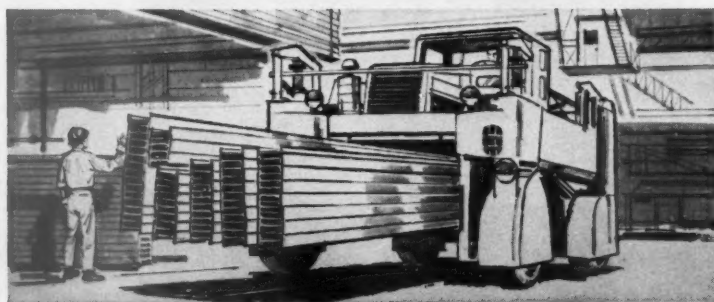
ARMED FORCES MANAGEMENT

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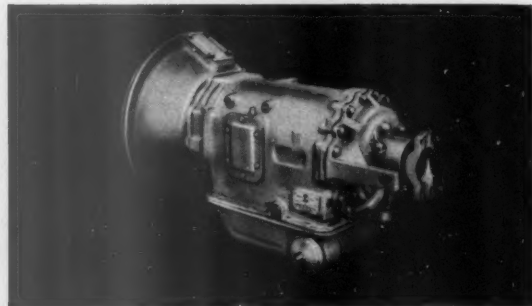
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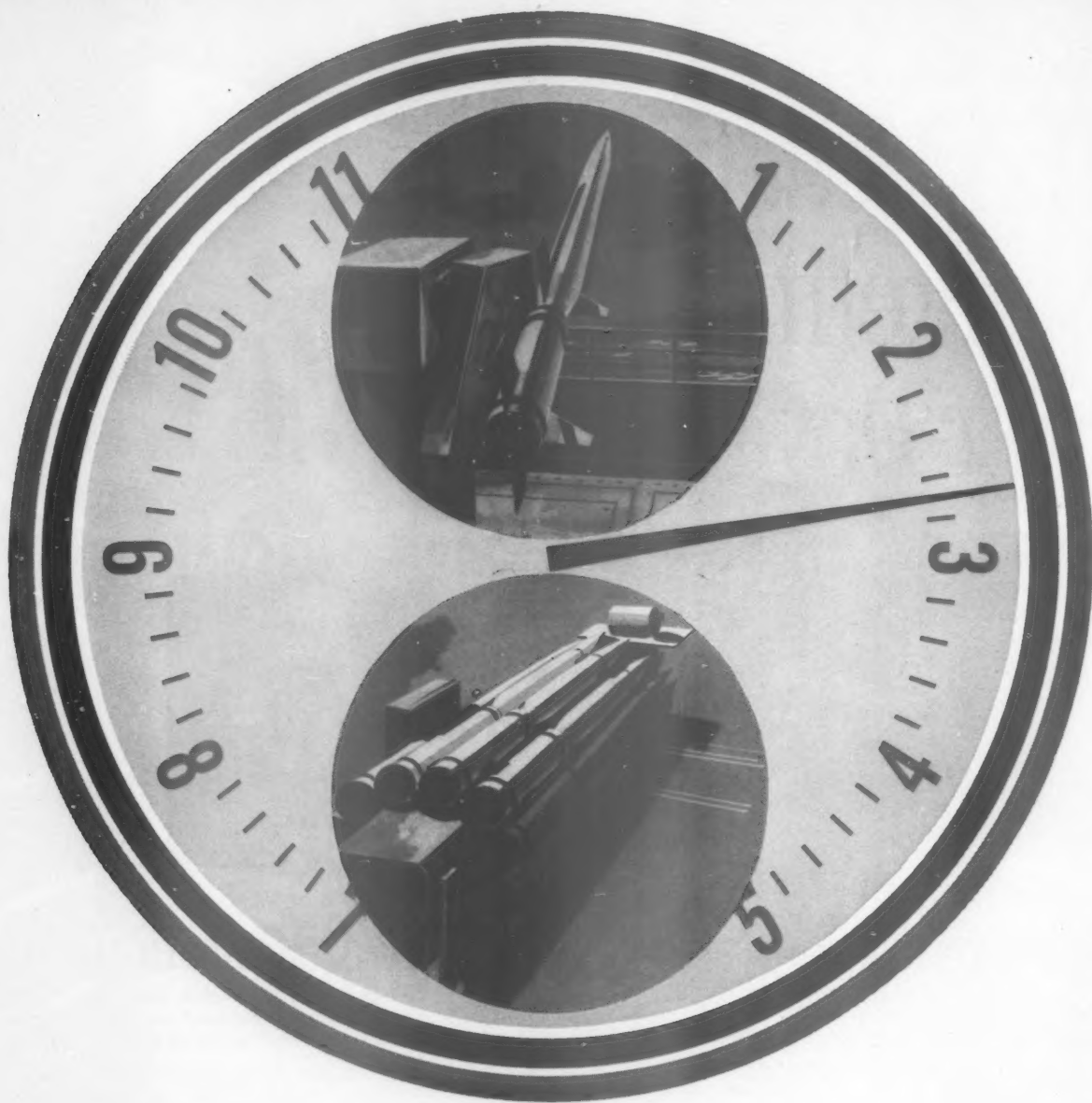
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SCIENTISTS AND ENGINEERS: JOIN THIS TEAM



Lt. Gen. Bernard A. Schriever

Commander, Air Research and Development Command

"We Had Youth"

The Commander of ARDC thinks the Air Force had less to overcome than the Army and Navy in that they didn't have the "great tradition and precedent" to contend with in setting up their research and development organization. Instead, they geared their organization to the present and to the job at hand.

"I NEVER think of leisure time as such. My work gives me enough change of pace to be relaxing."

That the job is varied is unquestionable: it covers one of the broadest research and development tasks in the world today, carries responsibilities that are as heavy as just about any others in the world today.

That it provides relaxation would necessarily depend on your point of view. The pace that is kept by Lieutenant General Bernard Adolph Schriever would probably put most people in a hospital after about six weeks.

But if this is the sort of work it takes to manage the Air Research and Development Command, the right man has the job. Shrugs his administrative assistant, pointing to a foot-high pile of papers on Friday afternoon, "If he didn't take them home, he'd be bored to death by Sunday."

Comments an officer on Schriever's staff, "Anyone not in good physical condition had better not work for this general. After three days of flying, I'm beat, but here he is at ARDC for a conference. This afternoon, he'll be at the Pentagon talking to the wheels; and tonight we'll go to the West Coast."

German born and Texas raised, somewhere along the line the six-foot-three 50-year-old general picked up the knack of operating on low pressure. Completely relaxed in almost any situation, Schriever goes one step farther, can catnap under almost any conditions.

But while the foregoing might be labelled a survival trait for the job Schriever has, his management background and management ideas are what insure that the job is being done in the best possible way.

There is probably no better measure

of Schriever's background than the list of accomplishments that he carries with him. And, necessarily, at the top of the list there is the country's first intercontinental ballistic missile program, the Atlas.

Starting with not much more than orders to build the missile, Schriever delivered what is probably one of the fastest, most effective development programs of major standing to date.

The reasons: long hours, hard work, dedication and a development technique designed by Schriever himself that provided one of the most effective variations on the good management theme to come along for quite some time. Its name: the concept of concurrency.

Says Schriever, "The time factor is more important than ever before. We have to move fast, because we simply can't buy time back. On a major development program for a weapon system, concurrency is the only thing that makes any sense at all in today's world."

The concurrency concept was beefed up by Schriever when he was Commander of ARDC's Ballistic Missile Division, and like most really good ideas, it was basically a simple one. Rather than develop major weapons in sequential order—first development, then test, then production. Schriever said, in effect, "Let's do everything at once. When everybody's through, we'll have a complete package that's ready to go, with no stragglers."

To understand what it took to make the idea work is to get some idea of Schriever's abilities as a manager. Imagine, for instance, training men to man a missile that had barely left drawing boards—and at the same time building the facilities to house the missile.



Obviously, the complexity of the program implies highly selective use, and Schriever sets the following criteria: (1) technical feasibility—will the system really work; (2) schedule feasibility—will the system be ready in time to stay up with the state of the art; and (3) military/cost effectiveness—will the system pay its own way in terms of dollar cost *versus* military effectiveness.

Schriever, incidentally, sets the same criteria for selecting weapon systems for development—with the clear implication that any full weapon system development program should definitely be measured against the concurrency concept.

But, Schriever points out, concurrent development programs fail to pay their way in anything less than a full weapon system. Citing Dyna-Soar, the ARDC Commander points out that its justification is on entirely different grounds.

"Our aim here is evolution of the state of the art, not necessarily a weapon system. A major part of our job is to push the state of the art as fast as we can, then make sure that we see all possible military applications."

The quiet spoken general cites the Atlas program as an example of what he means. Schriever notes that the ballistic missile program would have been an improbable, if not impossible project without the breakthrough on thermonuclear warheads. But with that breakthrough, Atlas justified itself as a full-blown weapon system, Air Force pulled the stops out and turned the reins over to Schriever.

The PEP Program

Always on the lookout for new ways of seeing the Air Force research and development management job is well done, Schriever has definite ideas on the Navy's PERT (Program Evaluation and Review Technique). In his words, "This is a fine and major step forward."

Schriever should know, for he was in on the ground floor in PERT development, was visited at BMD by Navy's VAdm. "Red" Raborn when Raborn and his staff were putting PERT together. In developing the Atlas, Schriever initiated a system that in many ways led up to PERT, only without the mechanization.

(The Schriever system itself has since been mechanized into PEP Program Evaluation Procedure).

But as usual, Schriever is wholly realistic about PEP. "We're using it on a number of programs, such as Dyna-Soar and Sky Bolt. But it can only be used to full advantage on major programs. We are also looking at the same basic technique for cost estimation. We know we can use it there."

Characteristically, Schriever has his own definite ideas about which course Air Force should follow in the future: "I can see a growing need for greater technical influence brought to bear on overall national strategy. Under the technical changes that have occurred in the past decade, the whole nature of the world has changed. In the future, there will probably be even more of this."

Sit or Attack

"Let me cite a specific example. If tomorrow the Russians came up with a totally foolproof ballistic missile and air defense, the repercussions would be immeasurable. They could either sit down at a conference table and negotiate us out of business, or simply launch an attack without fear of retaliation."


Commenting on his own organization, Schriever has this to say: "I don't mean to imply that the Air Force is smarter than anyone else, but we had youth in our favor when we set up the organization."

Where, in Schriever's words, "great tradition and precedent" exist in Army and Navy, Air Force had the chance to suit its research and development organization to the future, and to the job at hand.

On the other hand, the ARDC Commander feels that top level decision-making is too slow a process presently. "Cumbersome decision-making is too slow a process, and provides one of the big stumbling blocks for our work. I find myself wondering how much detail is really needed at the top decision level, and if time couldn't be better spent doing other things besides gathering details for presentation at this level."

Schriever's job calls for him to fly some 50 to 60 hours a month. But this could hardly be called travel time. About three-fourths of the time is at night. Says Schriever, "I can sleep well in flight." The rest of the time, Schriever works. Comments one aide, "I guess it's the only place he can go without having a telephone constantly ringing."

What scant leisure time Lieutenant General Bernard Adolph Schriever has is spent reading, or "occasionally at Canaveral I manage to do some fishing."

But if the Commander of the Air Research and Development Command fishes at Cape Canaveral, it's a sure bet that he has at least one eye on the missile launch sites—because that is the way he handles his job. 

BERNARD A. SCHRIEVER turned down what would probably have been a brilliant golf career to pursue stars, both the rank and celestial versions, in the U.S. Air Force. An outstanding golfer in high school, he was featured, when only 21 years old, in Ripley's *Believe It Or Not* for three times driving over 300 yards from tee to green on the par four 17th hole at the Brackenridge Park course in San Antonio, Texas, and taking one putt, each time for an "eagle"—a rare two under par in golf language.

Commenting on his skill with woods and irons, Texas Golf Professional Harvey Penick has said, "What a waste of talent. Here he is fooling around with missiles when he could have been greater than Ben Hogan."

Schriever's career started to rise when he was assigned to the Air Force Headquarters as Chief, Scientific Liaison Section, DCS/Material, in 1946. He held this position until 1949 when he entered the National War College. Graduating in 1950, he returned to the Pentagon as Assistant for Evaluation, DCS/Development, followed that with an assignment as Assistant for Development Planning (an outgrowth of the Evaluation Office).

In June 1954, Schriever was picked for an Assistant-to-the-Commander's job at Air Research and Development Command, and later took over ARDC's Ballistic Missile Division in Los Angeles, Calif.

The six ft., three in. Texan was given what was then, and still is today, one of the toughest jobs in the Air Force—setting up and directing the Air Force top priority IRBM-ICBM development.

Biggest headliner: his "concept of concurrency." Simply stated, it means all phases of the design-to-deployment cycle in development of weapons systems (weapon, facilities, personnel training, etc.) are undertaken simultaneously—rather than on the old step-at-a-time sequential basis.

The object: whack off lead-time at the knees. The result: under the general's personal supervision and leadership, every single R&D target date of the Air Force's major ballistic missiles was shortened, some by as much as three years on a planned seven year development time.

(Continued from page 24)

ment, Budget, et al) which tear programs apart, don't bring their particular piece back until deadline time—when it usually doesn't fit.

SP's two key answers: (1) a "no interference" edict from Burke to the rest of Washington, i.e. full authority going right along with complete responsibility; (2) complete control for SP over the money. Says one former SP admiral, "Unfortunately, programs have a habit of being nickel-and-dimed to death. We haven't been. You can't starve a weapon system in development or you won't get it. Either it will be under-designed or time will overtake it."

Adds Raborn: "It (the *Polaris* program) continues to be the only major weapon system anywhere with complete fiscal responsibility and control vested in the development team."

One more help: SP kept all the money in one bank account. Advantage: if for some reason, such as a

change in plans, one contractor suddenly didn't need all the money he'd been given, it could be pulled back quickly, shoved somewhere else where it was needed worse.

III—A Plan

A *Polaris* Steering Task Group spent three months outlining the programs parameters before a wheel ever turned on hardware development itself. Result: everyone who eventually got on the team had a clear idea of where they were going and what was expected of them. In addition, technical director Levering Smith had already roughed in a timetable (geared to submarine construction time) before he was even moved, officially, into the program.

Among the basic elements in the plan: "based on technical faith, all parts of the plan started with the preface 'assuming we are successful'—which is the general scheme we have used on all these things around here."

IV—On Paper

From the start, Raborn insisted that plans had to be reduced to paper. "If you can't reduce it to paper—so I can understand it—you don't know what it is." (This also avoided the technical program manager's constant fears of working with engineers who were running around with lots of plans tucked away in their brains that nobody else knew about.)

V—Communications

Other than PERT and the talented people running the show, probably Raborn's biggest assist was that he managed to convince the rest of the team, particularly contractors, "that he wanted no namby-pamby about how things were going."

Key method: the now-famous Management Control Center, nicknamed Program Countdown Room. Once a week, each week for nearly four years,

(Continued on page 35)

What Management Can Learn

SP suffered from recurring headaches in the one key area Raborn couldn't program into a computer—the running four-year fight with that influential Washington group known generally as "people with the power to say 'No!'"

Said Special Projects *

Mid-1958: Top notch *Polaris* team is winning its race against time.

March '59: Announced PERT, "a major breakthrough in research project management."

April '59: By cutting leadtime, especially in unpublicized new management idea area, SP will cut three years, at least, off original development schedule.

Oct. '59: *Polaris* missile firing batting average about .710; we've cut original delivery date of 1964 by four years.

Feb. '60: To take best advantage of *Polaris* breakthrough, "quantity orders" on boats should be placed now. Building takes a long time.

Mar. '60: At \$2.74 billion, *Polaris* will be operational by year-end.

April '60: Tests have proved all components; new operational date—this fall.

May '60: All technical objectives have been met. "July will be a very significant month for us."

Commented "observers"

Shots have failed, program may flop.

You can't program research.

Polaris won't be operational until 1965 "at the earliest."

System "may be ready by 1963," but only one or two submarines.

Defense tells House "We'll wait until system is really ready" before asking for more than the planned three-a-year.

Polaris still has technical problems.

Maybe, more likely they're just campaigning for more money.

Best bet: "This fall at the earliest."

What happened

See below.

Jan. '61: In use by rapidly growing number of defense-industry organizations.

July '60: First operational *Polaris* popped into the air.

Dec. '60: 2nd FBM deployed on station.

See above. Cost of hand-setting hard to estimate.

Fall '60: OK from Congress came in a rush. Total: "maybe" 19 subs.

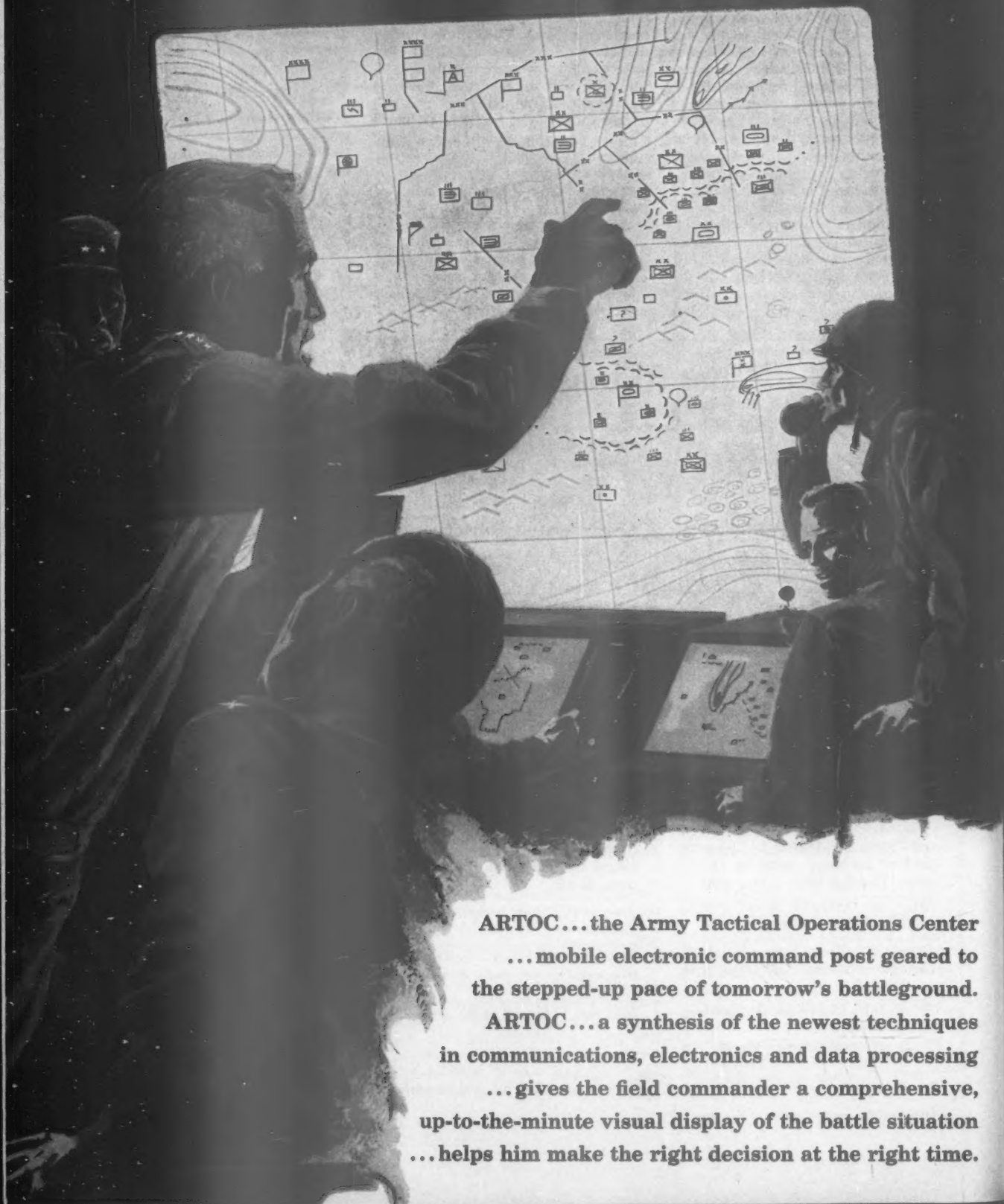
In July '60: . . . See above.

July '60: said the same observers, "A real breakthrough in weaponry; will revolutionize Naval warfare."

*Based on latest technical day-to-day information provided by team members—as run in ARMED FORCES MANAGEMENT.

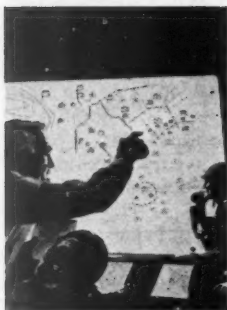
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Career opportunities are open for engineers and scientists

(Continued from page 33)

from 75 to 100 key Defense-industry team members have filed into that soundproofed room for what has usually been a hot session. Each "progress reporter" is held to an eight-minute time limit. Basic philosophy: "The easiest way for a person to avoid telling his supervisor how he is doing is by writing him a 200-page report. We use simple terms in which responsible people deal with one another."

Result: Raborn got the idea across quickly that he wanted straight answers to pointed questions—and that whenever he didn't the boom would fall.

VI—People

Everyone who went to work for Raborn knew from the start that "This is war and you'll be in it for the duration"—a dictum which eventually had to bend, but only slightly, to the evolutionary inevitability of death and promotions.

Beyond the obvious successes of SP's investment in people, outlined on the following pages, Raborn demonstrated other personnel talents. Most successful: even though armed with a "hunting license" to hire anyone he wanted, Raborn preferred trying to convince a CO that SP needed some employee more, used the "license" only when that failed.

In addition, he asked for people only when there is a definite job for them to do (and, in the beginning, when they had a place to sit down). "Setting this pattern," says one officer, "helped considerably, particularly later on when it became apparent that we were going to be going through a long series of expansions—and people on the outside began to fear this drain would never end."

VII—Faith

Finally, Raborn never hesitated, once his engineering experts had established technical feasibility on some part of the program, to jump in with both feet—a faith he has found noticeably lacking, since, at least outside of the Navy. Luck, many of his critics say, kept him from falling flat on his face. Counters one SP believer, "But a lot of that luck we made ourselves—just like a good football team is supposed to be able to make its own breaks."

Which brings many analysts of Defense R&D procedures right back to an observation made at the end of that article in December, 1958, AFM: "not enough people with influence seem to realize that, without any Defense reorganization, many of the top R&D projects going today could and should be handled using the same approach."

THE MANIPULATION OF HUMAN BEHAVIOR

Edited by ALBERT D. BIDERMAN, *Bureau of Social Science, Inc.*, and HERBERT ZIMMER, *Georgetown Univ. School of Medicine*.

A cool, critical examination of current conjectures on the use of scientific developments in controlling human behavior. Sensationalism is studiously avoided, in order to arrive at *known facts*. Each section of the book has been prepared by a scientist who has done experimental work on his subject and has reviewed the literature in his field.

Some ideas about control find support, some are left in the undecided category, and others are clearly reversed. All evidence has been examined by physicians, psychiatrists and psychologists. From this work, what is known and important is set forth here.

CONTENTS

The Use of Drugs in Interrogation • The Physiologic State of the Interrogation Subject as It Affects Brain Functions • The Effects of Reduced Environmental Stimulation on Human Behavior • Physiologic Responses as a Means of Evaluating Information • The Potential Uses of Hypnosis in Interrogation • The Experimental Investigation of Interpersonal Influence • Countermanipulation Through Malingering.

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Edited by D. G. MALCOLM, *Operations Research Inc.*, and A. J. ROWE, *System Development Corp.* General Editor, L. F. MCCONNELL, *System Development Corp.* How to develop workable systems for today and for the long-range future. Shows how computers are used to design management patterns, which allows for pre-testing of policy and procedures.

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(Continued from page 26)

Polaris missile systems manager at Lockheed's Sunnyvale Missile Systems Division.

A combination scientist and strong-minded manager, he has been with the program since Day One, in direct charge of all efforts by Lockheed and its hundreds of subcontractors and suppliers, took some calculated risks to get optimum results in the shortest possible time. Among the gambles:

(1) Scheduling for specific target dates many systems and components which were not within the state of the art at the time they were committed. (2) froze the external configuration of Polaris at program inception, so that submarine design could proceed—and insured that the necessary components could fit in this envelope.

Like with North American, technically a subcontractor, Aerojet General's solid rocket plant has been a major factor in solid fuel engine success, is run by another pioneer in solid propellant rocketry, **Richard D. Geckler** who has been with Aerojet since 1945.

A 1939 phi beta kappa graduate of De Pauw University, he was at stage center in September, 1945, when the "guided missile age, a whole new area in rocketry, was just beginning." "His genius at mathematics and chemistry," say fellow scientists, "has played a major role in boosting solid rocket size and performance ten-fold in the past 15 years, under the constant whiplash of military requirements."

Fire Control and Guidance

A one-foot error in altitude and/or lateral direction will be magnified roughly 15 times in the impact area—and Polaris' ultimate guidance goal is .1 of a mile accuracy. Answer came from team organized under M.I.T.'s **Dr. C. S. Draper**, one of the nation's foremost experts on inertial navigation. (See below)

Monumental task of turning his ideas into a practical production item went to General Electric's Missile & Ordnance Systems division. Manager: **Gene R. Peterson**.

Added to all the other problems in a field just barely out of the research stage, Peterson's department had to make deliveries against schedules accelerated by more than two years.

Peterson has been with G.E. since 1941 (except for a World War II stint with Navy as an electronics officer), managed the company's communications and data handling systems engineering operation for six years, until appointment to his present job a year ago.

Navigation

As with fire control and guidance, problem is tremendously complex and, like guidance, basic approach came from Draper. Systems manager: Sperry Gyroscope. President: **Dr. Carl A. Frische**.

North American Aviation's Autonetics Div., although technically a subcontractor, has made prime-sized contribution to the program. (First five SINS were built by Autonetics as will be others.) Division president is a young (45) mechanical engineer named **John R. Moore** with a brilliant engineering background: 9 years with General Electric supervising gunfire control, computing and tracking, servomechanism and gyro stabilizing equipment developments; 3 years as director of Washington (St. Louis) University's dynamical control lab directing study contracts on missile guidance and control systems. On North American's payroll since 1948, he holds an arm-long list of honors, awards, and memberships in scientific, military and management organizations.



Procurement Trends

OVERALL ELECTRONICS PROCUREMENT BY THE AIR FORCE in 1962 will be less than 1961. Reason: the BMEWS and SAGE systems and the DEW line will be substantially completed with funds for 1961 and prior years. In the same field, the Army is getting funds for continued improvement of the Missile Master system to ensure compatibility with SAGE for the North American Air Defense Command.

BATTLEFIELD SURVEILLANCE, TROOP MOVEMENTS and rapid logistical support for ground forces will be augmented by the Army's planned purchase of 261 additional aircraft. The twin engine Mohawk is an observation plane with surveillance and aerial photography capabilities. The Caribou, also twin engine, is a transport aircraft for combat zone re-supply, emergency medical evacuation and troop transportation. The Iroquois, a utility helicopter, will be used for the transportation of personnel, supplies, equipment, special teams and for medical evacuation. The Chinook, a medium transport helicopter can carry 26 fully armed combat troops or three tons of normal cargo.

PROGRAMS FOR THE IMPROVEMENT OF RESEARCH in the military applications of space technology and space vehicles will be carried on in FY 1962 with an estimated \$584 million. Among the continuing projects are the Air Force's Samos, Discoverer and Midas; the Navy's Transit, and the Army's Advent. All these projects were transferred to the military services last year from the Advanced Research Projects Agency of the Department of Defense.

FUTURE PROCUREMENT OF MILITARY RESISTORS may be governed by a new specification published by the Armed Services Electro-Standards Agency at Fort Monmouth, N.J. The specification which the Military Department intend to establish in the Qualified Products List was designated by ASESE as "MIL-R-18546—Resistors, Fixed, Wirewound, Chassis Mounted." Interested manufacturers are urged to communicate with ASESA for specific information on the submission of products for qualification testing and approval, the agency stated. In future procurement, awards may be made by Government Contracting Officers only for such products as have been tested and approved for inclusion in the Qualified Products List prior to the bid opening time, whether or not such products have actually been so listed by that time.

FUNDS FOR MORE THAN 1,000 TERRIER, TARTAR, AND TALOS surface-to-air missiles are included in the 1962 budget for anti-air-warfare in line with the scheduled commissioning of guided missile ships. Several thousand Sparrow III, Sidewinder, and Falcon air-to-air missiles also will be procured, and another item calls for a large number of Bullpup air-to-surface missiles to boost the effectiveness of Navy light attack bombers and Air Force fighter bombers in non-nuclear air operations.

FURTHER IMPROVEMENT OF THE IN-FLIGHT REFUELING capability of the Strategic Air Command is indicated in the new budget with a proposal to maintain in 1962 the current rate of production of KC-135 jet tankers even though no appropriations were sought for B-52 and B-58 aircraft.

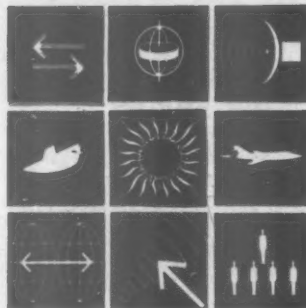
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Procurement Trends

Contract Awarded For B-58 Invisible Shield

A \$9-million contract was awarded last month to General Telephone and Electronics Corporation for continued production of electronic defense systems for the Air Force's B-58 Hustler bombers. This brings the total awards to approximately \$150-million for development and production of Hustler countermeasures systems during the past seven years.

The B-58's electronic defense system provides an "invisible shield" of electronics which baffles enemy radar and radar-guided missiles directed against the supersonic bomber. The lightweight defense system, the most advanced of its kind in operation today, is comprised of three major sub-systems: radar warning sub-system, chaff dispenser control, and radar track breaker.

Effectiveness of the Hustler's "invisible shield" was demonstrated early this fall when the B-58 entered its first competitive tactical test during the annual Strategic Air Command radar-bombing competition. The B-58, which had been operational for only six weeks prior to the competition, came out fifth in a field of 13 veteran aircraft.

Periodic test equipment, housed in 21-foot trailers, performs on-the-spot tests of the system without removing the equipment from the aircraft. To date, four of these test trailers, valued at nearly \$500,000 each, have been delivered to the Air Force.

Senate Subcommittee Hits Defense Procurement

A Senate Small Business Procurement Subcommittee report has criticized excessive use of negotiated defense contracts and sole source awards. It called for a re-evaluation of the Armed Services Procurement Act "in light of the constantly changing requirements of modern military weaponry." The committee, headed by Sen. George Smathers (D-Fla.), based its report on testimony taken in the last session of Congress.

In a statement, Smathers said the report is aimed at the "evil of non-competitive buying which is unfairly depriving qualified small business firms of millions of dollars worth of prime contracts."

Since 1954, the report noted, small firms have been awarded a smaller percentage of appropriated dollars spent for defense supply and services. "In 1954, the small business percentage was 25.4% and by 1960 it had

declined to 16.1%," the report said.

"Perhaps the most fruitful area for increasing small business participation lies in the purchase of replenishment spare parts," the report said. "All too often, replenishment spare parts are . . . repeatedly purchased from or through the maker of the end item." The committee urged military departments to exert greater effort to obtain competition in the purchase of spares.

The committee also recommended a self-policing effect for negotiation by conducting public openings of quotations and public announcements of every change in the quotation between the opening and the award of the contract. The committee asked the Assistant Defense Secretary (Supply & Logistics) to conduct a new survey to determine where expediency and other "unnecessary reasons" contribute to excessive negotiated procurement. Investigators said they agreed with GAO that negotiation would be improved "if contracting officials were required to negotiate with all offerers within a given range . . ."

Bendix Corp. Awarded Pershing Contract

Receipt of a \$20-million contract for continued manufacture of the inertial guidance system for the Army's Pershing Missile was announced recently by the Eclipse-Pioneer Division of The Bendix Corporation.

The multi-million-dollar contract, which covers inertial platforms, guidance computers and associated test equipment, was received from the Martin Company. It represents part of the \$138-million contract announced on December 30, 1960, by the Martin Company—prime Pershing contractor—and the Army.

The Pershing is designed for launch-

ing from a mobile transporter-erector-launcher and will have a greater cross-country mobility than any other U.S. ballistic missile. The inertial guidance system will enable it to direct itself onto a target without the possibility of outside jamming.

Army has described the Pershing test firings as "highly successful."


Major Space D&P Under One Agency

Responsibility for development and procurement of any major space launch vehicle will be vested in the future in a single agency—either military or civilian—as the result of a decision announced recently by the Aeronautics and Astronautics Coordination Board. Established last September, the board was directed to recommend policy for avoiding duplication and to promote more efficient use of the nation's space resources.

Under the board's policy, Agena-B has been made the full responsibility of the Air Force. All Centaur vehicles will be controlled by NASA regardless of whether they are used in military or civilian space programs.

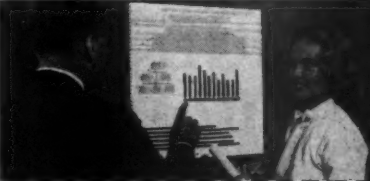
Other actions include: (a) assignment of dissemination of unclassified orbital information to NASA, following transfer of control of Air Force Space track facilities and Navy's Spasur (satellite detection net) to the North American Air Defense Command (Norad) in November; (b) establishment of joint planning by the Air Force and NASA for modification of present launch pads at Cape Canaveral to accommodate space vehicles using Atlas first stages.

Seven liaison groups linking DOD and NASA have been disbanded on the board's recommendations and five were assigned to various panels of the board itself. To coordinate military and civilian bio-astronautic activities, this responsibility was assigned to the board's Panel of Manned Space Flight.

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Management personnel from the three armed services, DOD and NASA compose the coordinating board. Dr. Herbert F. York, Director of Defense Research and Engineering, and Dr. Hugh L. Dryden, Deputy Administrator of NASA, are co-chairmen.

\$1-Billion Increase Seen For Defense Spending

An increase of more than \$1-billion in Defense Department spending for research and development in 1961 is foreseen by a Minneapolis-Honeywell Regulator Company military electronics official.

Stephen F. Keating, Honeywell vice president and head of its Military Products Group, estimates total defense spending for research and development in 1961 at about \$4-billion, with a steady expansion to approximately \$7-billion by 1965.

He attributed a major portion of the expected increase to the complexities of missile and space systems and the scientific challenge they have created for government and industry. Also, he said, many new technologies must be developed to satisfy national defense efforts.

"The expected figures for 1961, and

other factors make it apparent," the executive said, "that companies with a strong record of accomplishment in research will be in a dominant position in the rapidly growing missile and space market. Depth of experience and proven capability in advanced technology will be utilized to the maximum."

The future position of companies in the military electronics field will depend on their ability to attract research and development funding, Keating said.

Hazard Coverage Sought For DOD Contractors

Department of Defense is again asking Congress to pass a bill authorizing indemnification of defense contractors against unusual hazards encountered in production and construction projects. Such protection has been in force for nearly 10 years in relation to R&D contracts, but two attempts to gain passage for similar coverage of production and construction have failed.

As more and more major defense programs reach production in the space age, DOD warns it will face serious negotiation problems for vital weapons systems unless such protection is provided.

The DOD proposal asks for indemnification of prime and subcontractors and includes direct settlement of third party claims against them up to \$50-million without additional congressional appropriation. Such protection would be authorized only in the event that other insurance or compensation arrangements did not apply—the intent being to cover situations beyond the contractor's regular hazard insurance coverage. Underwriters are currently reluctant to write protection except for certain selected risks in the extreme hazards area.

Serious problems will be raised, DOD insists, in the fields of atomic energy, missiles, propellants and other military production because contractors feel they may incur large losses in these extra hazardous undertakings.

Expert Lists Five Aids For Production Shifts

A shift from large to small production volumes will bring substantial changes in the defense business, John H. Richardson, vice president of marketing of Hughes Aircraft Company, told the American Management Association in Los Angeles recently. One of the last high-volume defense

WHY AIR FORCE HAS ADOPTED MICROFILM FOR ENGINEERING DRAWINGS

Recently the Air Force issued new contract requirements that makes the use of microfilm mandatory for most engineering data and records relating to items delivered by contractors and their vendors.

The new requirements (MCP-71-77) incorporate standards and specifications issued earlier by the Department of Defense for its Engineering Data Micro-Reproduction System. The Air Force move is more proof of the importance of microfilm to the government in saving time, money and space.

Obviously, the Department of Defense and the Air Force are convinced that working with microfilm is easier than working with paper, that it is more efficient and costs less. In other words, the government has discovered that filmwork is easier and more practical than paperwork for engineering drawings and records.

This is not news to the many industries that use microfilm today. They know that microfilm is a highly efficient and effective production communication tool. They know that microfilm can do many jobs much faster and much more accurately, with almost fantastic savings in time and money.

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procurement cycles will end with the final deployment of ballistic missiles, he said.

He listed five steps that marketing people can take to cope with the new defense market:

(1) Establish surveillance over the entire defense and commercial markets in order to select those products and sales objectives which will be the most promising in the long run.

(2) Strengthen the size and capability of marketing organization particularly by building up a qualified staff of sales applications engineers who are marketing oriented.

(3) Set up substantial research and development budgets which will enable a company to do system analysis and preliminary design work on promising programs.

(4) Improve company planning machinery by integrating marketing, engineering and financial planning.

(5) Strengthen managerial control over the enterprise by establishing realistic marketing objectives, defining the tasks and organizing a program to realize these objectives, setting up a financial plan and budget to carry out the work program and measuring actual performance against planned performance.

Cost of Spare Parts To Drop In FY 1962

Procurement of aircraft spares by the Navy—averaging about 20% of the flyaway cost of each aircraft for the past several years—will drop below that figure for the first time in FY 1962, according to Vice Admiral George F. Beardsley, Chief of Material. Reductions in inventories of high-value items and deferred procurements are expected to afford sizeable savings in the Navy's spares programs, Beardsley said.

Quantity spares procurement will be held up "within reason" until valid "fail rates" are established for individual items. The rate of aircraft out of action awaiting parts has steadily gone down during the last few years despite a major reduction in spares inventories, Beardsley noted. Navy operations and procurement officers are keeping tab on a total of 28,000 aircraft engines—installed in airplanes and available as spares. This inventory has been reduced "between 2000 and 3000 engines" in the last few years.

But during this same period (1958 to June 3, 1960) Navy's AOCP rate has dropped from an overall 9% to 3%—making 400 more aircraft flyable.

The total number of spares kept in the Navy inventory has also been reduced drastically during the past eight years—from 55,000 items in 1952 to only 16,000 items in 1960.

"We are still studying these procurement policies in terms of the savings they will afford, but industry studies indicate that storage facilities and personnel involved in inventorying large quantities of material may cost 20 to 30% of the value of the items stored," Beardsley stated.

ARPA Funds Payloads To General Dynamics

The Advanced Research Projects Agency has awarded a \$1.9-million contract to Convair Astronautics Division of General Dynamics Corporation for the construction of three experimental satellite payloads, DOD has announced.

The payloads which will be launched starting early in 1962 on three test vehicles of the National Aeronautics and Space Administration's Centaur series, will be placed in 22,000 mile orbits.

The payloads will be designed to supply supporting data for future military space programs.



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A New Link In SAC's Chain

An independent, automated intercommunications system now links strategic points within and outside SAC Headquarters to insure swift, accurate

reception and dissemination of intelligence data and orders. The new system offers instantaneous, trouble-free contact with these points.

SAC's NEW HEADQUARTERS building at Offutt Air Force Base near Omaha, Nebraska, is the nerve center of the most powerful military force ever created. As such, it had to be furnished with communications facilities which meet the importance of SAC's mission.

Air Force realized that, in these electronic-nuclear times, when swift, accurate reception and dissemination of intelligence data and orders can be the difference between a nation able to strike, and one swept to destruction because of unpreparedness, the role of communications is paramount.

That the right people at SAC's Offutt AFB HQ needed instantaneous, trouble-free contact with Washington, bases throughout the world, and other external message points was fully agreed upon.

But it was seen as equally indispensable that streams of information should flow within SAC headquarters with the least effort in the shortest time, and with absolutely no chance of failure.

The Operation

Facts and instructions received at SAC must be circulated and acted upon. Information must be channeled between command levels from one division to another. Each SAC team member must know prevailing conditions affecting his functions, and be able to report changes affecting performance of those who depend on him.

Only by keeping internal and external lines independent of one another, only by providing each with separate operating equipment could noninterference of the two systems be assured.

The contract was awarded to Dictograph Products, Inc. and they immediately started a special system to meet SAC's intercommunications needs.

Dictograph designed an independent, automated intercommunications system that would follow SAC's command chain and link only those personnel who had to communicate regularly to work productively.

Putting the plan into action, they installed 11 Executive stations, with 46-call-point capacities; 97 Staff sta-

tions, ranging from 12 to 42-call-point capacities; and 98 Personnel stations, limited to calling two points, but able to receive unlimited incoming calls.

Executive stations were for SAC Commander-in-Chief General Power, the Vice Commander-in-Chief, the Chief of Staff, the Deputy Chief of Staff, the Director of Operations, the Deputy Director of Operations, and the Directors of Materiel, Intelligence, Personnel, Comptroller, and Plans.

Director of Civil Engineering and his Deputy, Director of Administrative Services, Deputy Director of Intelligence, Director of Information, and the Inspector General were all furnished with 42-call-point Staff stations, allowing immediate access to all Executive stations.

The Hook-up

General Power has, for example, direct lines to the Chief Operations Analyst and the Weather Division. But should Power need data from the Construction Division, he would contact Director of Civil Engineering or his Deputy who, in turn, would get the information from the division and relay it back.

Similarly, if Power wants to check with Internal Security, he would contact the IG who would relay the request to Internal Security. If the latter needs more data, he can contact Security Plans. Information is channeled back through the IG.

The system allows Internal Security to keep the line open to the IG while he gets the information from Security Plans. In other words, all three parties can be on the line at once and can to iron out any problems without frequent call backs and attendant time delays. CINC could also be on the line if he so desired.

For an Executive or Staff station to make contact with another station, the key with the name or title of the desired party is pressed. This instantly lights the key with the caller's name and sounds a clear tone signal at the called station. On concurrent calls, the visual system lets the called party set his own priority.

Immediate contact, without a switchboard, is achieved by pressing the

lighted key. All Executive stations have a microphone and a modulated loudspeaker with volume control, allowing the user hands-free conversation.

If he wishes to use the handset for complete privacy, the loudspeaker is automatically silenced.

Executive and Staff stations have a special conference feature so the user, by pressing the right keys, can confer with up to four other points simultaneously. The Director of Materiel, for example, can speak to his chiefs of Procurement, Supply, Logistics, and Maintenance Engineering at once. They, in turn, can inform him and each other of current status at their sections.

Five Executive stations have a key which rings all stations to which they are connected, so the user can speak to all key personnel at one time.

The entire system—206 Dictograph stations—was duplicated in SAC's three-story, three-block-long underground building, itself a duplicate of the HQ building at ground level.


Both Dictograph systems—above- and below-ground—emanate from the main telephone distribution frame underground. Any line in either system can be rerouted in minutes by merely moving a pair of wires.

Always Operative

In an emergency in which cables above ground are damaged, an 800-line disconnect switch can cut off all equipment above-ground and keep the below-ground system in full, independent operation. If any part of this switch is not working, a light spots the trouble.

If there is any stoppage in the power or light anywhere in either building—if a fuse, a circuit, or a transformer burns out—the Dictograph power system automatically switches to batteries which can operate six months or longer. With power restored, the system automatically reverts to the 100-volt supply.

Operative 24 hours a day under any and all conditions, custom engineered internal communications play an indispensable part in SAC's efforts to preserve the peace through preparedness.



He's got Minutemen "working on the railroad"

Hard basing is one way to protect America's force of retaliatory ICBM's. The problem was to find an alternate means of accomplishing the same mission. The Air Force solution was a new ICBM mobility concept—railroad car-mounted Minutemen, utilizing the nation's vast track mileage for numerical and geographical dispersion, creating a difficult target for enemy attack.

To put the Minuteman, its support systems and associated equipment on rails was a completely new problem in missile handling. The first requirement assigned by Boeing to American Machine & Foundry Company and ACF Industries, Inc., was a feasibility study of the existing limitations of roadbeds, rails, railroad operations and right-of-way. Unique tactical cars are being designed within these limitations to carry the Minuteman—cars that can handle the missile and its operating equipment, safely isolated from roadbed shock and ready for immediate retaliatory launching.

Single Command Concept

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How Managers Can Do Better

Establishing objectives, maintaining cooperation, and making decisions are considered the three basic functions of a good manager. Here

is how managers at all levels can achieve better management and contribute to the defense of the Free World . . .

by George H. Roderick

IN the face of the military and economic might of the Soviet Union, we are faced with the problem of how to shoulder the principal burden of an adequate defense posture for the Free World and yet, at the same time, preserve a sound economy. One of the most important, and indeed an essential element for the accomplishment of this dual objective, is improved management.

Since good management is an essential ingredient of the Free World's defense, the actions performed by managers at all levels will contribute greatly toward achievement of this better management. Although there are a number of important areas in which a successful manager must function well, these three—establishing objectives, maintaining cooperation, and making decisions—are considered the basics.

The First Function

The first of these functions—establishing of objectives by the military manager—contributes directly to sound management of his organization. This contribution will be good, bad, or indifferent in direct proportion to the efficiency and effectiveness with which the individual manager applies himself to this vital and continuing task.

The need for this function is obvious. An organization, composed of parts or elements, each headed by a manager, exists to carry out a mission. Each element is an organization in itself, with its manager and groups of people, who assist in accomplishing the mission. These managers and groups of people must be provided a sense of direction—they must know and understand the objectives of their organization. If they don't, or if their understanding is clouded or confused, they may well be working aimlessly—for the sake of working.

This point is well illustrated in the simple story about the eminent architect, Sir Christopher Wren, who was visiting the site upon which one of his magnificent edifices was being constructed. He approached one stone mason who was busily chipping a block with his hammer and chisel and asked "What are you doing?" The man replied, "I am squaring up the surface of this stone." The architect then moved

on to another and asked the same question, "What are you doing?" This time, however, he got a different reply. The stone mason looked up at him and said, "Why, sir, I am helping to build a cathedral."

In setting objectives you should see that each of your people is able to stand back and see his job as part of the total undertaking and gain stimulating incentive from this knowledge. It is a well-known characteristic that the American who is a member of an organization feels a need to know *why* he is doing *what* and the *what* and *why* of his organization's activities.

The nature of objectives will vary somewhat with the type and mission of the organization, but there are some common characteristics. For example, the objectives must recognize, be consistent with, and contribute to those of the parent organization and they must be stated in measurable terms. Experience and research reveal conclusively that organizational objectives are of limited value unless accepted by individuals responsible for their accomplishment.

Participation in establishing organizational objectives by the personnel responsible for achieving them will contribute materially to acceptance of these objectives and result in favorable attitudes toward the leader. The manager will have sound objectives and his people will work harder and more cooperatively to achieve them. The entire team will be working toward commonly understood goals which it has become morally committed to attain.

The Limitations

Of course, participatory goal-setting, or establishing objectives, has its limitations, both inside and outside the Services. There may be many objectives over which the individual manager has little or no control and which he must pass down to his subordinates unchanged. In doing so, he will do well to explain this situation to his subordinates. The individual manager must identify those areas which will lend themselves to participatory setting of objectives. Timing is also important. Obviously, the heat of battle is no place for "on the spot" goal-setting. Participa-

tion through advice and recommendations of staffs and commanders has already been achieved. When bullets are flying, it is no time to vote!

Participation is an aid to leadership, not a substitute for it. "Loneliness of command" is still the commander's and manager's lot, but he will be less lonely and more effective if he can achieve maximum acceptance of valid and attainable goals, properly established.

Organizations are established to carry out assigned missions, but organizations are not effective without leadership. Organization charts are simply charts, until the manager breathes life into them. Regardless of what the chart theoretically proclaims the organization structure to be, it is the manager—by his actions, manners, attitude and personality—who determines how successfully or poorly the organization will operate.

The Second Function

In the past, in many organizations with simple structures and uncomplicated missions, a "one man show" has frequently been possible. In today's services, with their size, complexity, costs and world-wide scope of operations—plus their readiness requirement for immediate expansion in the event of national emergency—it is essential that the military manager utilize effectively the skills, training, and professional qualifications of his personnel to get the job done.

The atmosphere or climate which he creates will decide to a considerable degree over-all productivity of his staff and subordinates. That favorable climate is one in which each member of the organization believes his contributions and efforts to be important and worthwhile—wherein each individual believes he is a team member of an aggressive and progressive organization—wherein each knows that his manager is receptive to new ideas and to creative thinking. In such an environment the individual is convinced that the actions of his manager are the best for the accomplishment of the mission and for the benefit of the whole.

To establish and maintain a cooperative system the manager must institute realistic and attainable standards of performance—not set arbitrarily, but wherever possible with subordinates ac-

tively participating in their initial preparation. If subordinates so participate, the manager will benefit not only from the standards being met or exceeded, but also because research reveals that invariably they will be higher than if he alone had developed them. Standards must be revised periodically when appropriate—again with subordinates participating—and when practicable. Managers must exercise care that revisions do not penalize good performance, but are in keeping with improved methods and procedures.

The manager must minimize, and, in time, eliminate parochialism. Full effectiveness of an organization will not be realized until each element thereof—staff and line—is required to function as an integral and inseparable part of the team.

The last function of the manager is decision making—the key to any managerial task. Managerial decisions, particularly of the policy type, may make or break an organization, even though all other elements of leadership are present in abundance.

The First Step

First step of the manager in making a decision is to determine the problem. Many times, upon determination and definition of the task, solution and decision become apparent. Too frequently, decisions are based on a faulty analysis or wrong definition of the problem—on some unanticipated or very restrictive aspect, not apparent or intended. Frequently the manager must stop to reassess and re-evaluate the problem—even to request clarification from above.

Next step is to evaluate the situation and formulate solutions. The manager must put each factor in its true perspective—he must view the entire problem and all its elements, including resources available and budgetary and legal implications. He deduces possible solutions or courses of action. The manager must next consider and compare the various decisions open to him. He must evaluate the possible and probable effects which each will have, including the long-range effects of his short-range decisions. The final step is actually making the decision. Now the burden is the manager's own—and his alone. At this point the weak individual fails—the strong survives. The bold may make mistakes, but the rewards of common sense and sound judgment, energetically and judiciously applied, are success and satisfaction.

After the decision is made, the manager must then ensure that it is stated clearly and concisely. Those responsible for implementation should be advised as early as practicable and kept informed. If time and the situation per-

mit, they should be given opportunity to voice views and opinions.

Frequently the manager must make decisions contrary to the advice and recommendations of his staff and subordinates. The wise manager creates a climate wherein all concerned know that they and their counsel have been considered.

A Vital Element

Timeliness is a vital element of decision making. The military manager—in the office and on the battlefield—is frequently required to make an early decision without complete information. All desirable information will rarely, if ever, be available in time. The manager may realize that if he waits too long, events may overtake him, generating a greater and more complex problem. His most difficult decision may be to decide when to decide. Frequently, only his capacity and experience can assist him; results will be some measure of his success or failure.

Subordinates very properly expect the manager to make positive decisions. They do not expect him to use his authority to let "nature take its course," or to do nothing. One of these positive decisions must establish a balance between decisions to be made by him and those to be made by subordinates. At no time should delegation be used for abdication of authority. The manager must ensure that staff and subordinates do not usurp his prerogative of decision making.

He must insist on subordinates intelligently conforming to his approved plans, policies, procedures, objectives and decisions.

The manager must promptly resolve opposing views of his staff and subordinates. Teamwork is essential!

In conclusion, the successful manager is one who obtains resources and then utilizes all of them with maximum efficiency and economy. Above all, he must understand his people, realize and use their potentialities, and assist them in their development.

The type of manager which the Armed Services are seeking to develop is one who can, over the long term, excel, in results, his counterpart in the authoritarian society. As the world struggle between two rival systems deepens, free management faces its severest test. In this competition for survival, those in the management field have an individual responsibility to contribute their own best effort. If we all exert this effort, there is no doubt as to the outcome, because no system in the world can surpass that based on the enterprise of free men under enlightened management.

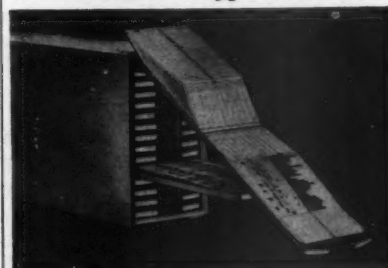
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Research Rundown

SUBSTANTIAL INCREASES IN THE COST OF CHEMICAL ARSENALS ARE

FORECAST in the new budget by the Army which has primary jurisdiction in this area. The 1962 estimate is \$30.5 million as compared with \$25.3 in 1961 and \$20.9 million in 1960. The Army's two chemical arsenals, the budget said, are equipped for volume production and loading of hazardous chemical materials. Production in 1960 was limited to orders in support of research and development and maintenance of standby plant and equipment. The cost increases for 1961 and 1962 are the result of the use of higher cost components in the items being manufactured.

CHEMICAL PROVING GROUND AND RESEARCH COSTS WILL ALSO IN-

CREASE. The Army is asking \$67.9 million in 1962 against \$59.2 in 1961 for its three activities in this category which are engaged primarily in work on chemical and biological warfare agents, delivery systems, and protective items. The cost increases were ascribed to salary increases for classified employees, and the expanded manufacturing program.

ONE EXAMPLE OF DEFENSE INDUSTRY'S MOUNTING SUCCESS in broad-

ening its market base into Europe came from Lear, Inc., recently. Its German subsidiary in Munich, since its formation in 1956, has specialized in the overhaul and manufacture of aircraft instrumentation and electronics equipment. The Munich firm now has a backlog of more than \$2,250,000 of orders and has a number of research and development contracts with the U.S. Army and the German government.

Lear's Munich laboratories developed the ultra-precise "North Seeking Gyro" and is scheduled to furnish equipment for the NATO F-104 Starfighter and radio compasses for the Fiat G-91 lightweight fighters in the German Air Force.

EISENHOWER PROPOSAL TO FOLLOW ONLY ONE ROUTE in the de-

velopment of a nuclear aircraft engine triggered repercussions in the Joint Committee on Atomic Energy. Representative Melvin Price (D.) of Illinois, chairman of the Research and Development Subcommittee, said the recommendation was arbitrary and unrealistic. He said the proposal, which would cut in half the funds for the project in the budget of the Atomic Energy Commission, would embarrass the new administration during the transition period.

DEVELOPMENT OF SINGLE MANAGER SYSTEMS in the Armed Serv-

ices will get a substantial boost if supplemental appropriations requests by the Defense Department for this purpose in Fiscal Year 1961 are approved. Disclosed in connection with the publication of the 1962 budget proposals, the requests included \$10.2 million and \$1.9 million for implementation of Single Manager agencies in the Army and Navy, respectively. For further progress reports on the Single Manager system, see AFM, November 1960.

MILITARY AND COMMERCIAL COMPUTING MAY BE ADVANCED con-

siderably if expectations for a pneumatic digital computer are realized. Under development by the Kearfott Division of General Precision, Inc., the pneumatic computer is represented as capable of doing everything an electronic or mechanical computer can do in certain applications. In addition, it will be smaller, cheaper, more reliable and easier to service and test.

Research Rundown

Navy Can Now Talk To Submerged Polaris Subs

Critics have long contended that one problem that has plagued submariners since the first submarine was invented has been the inability to communicate with the outside world while submerged.

However, the Navy has been taking impressive steps to eliminate this problem; announced last month the operational testing of the world's largest radio transmitter designed to communicate with Polaris submarines while submerged.

The two-million-watt transmitter, located at the Naval Radio Station, Cutler, Maine, was constructed by Continental Electronics Manufacturing Company, a subsidiary of Ling-Temco Electronics, Inc., of Dallas, Tex., under contracts for some \$50-million.

Design and construction of the very low frequency radio station were accomplished under the supervision of Navy's Bureau of Ships and Bureau of Yards and Docks. In all, some sixty government contracts with various firms were required for completion of the powerful radio transmitter station which was completed a year ahead of schedule.

VTOL Aircraft Planned for NATO

Britain and West Germany will jointly develop the subsonic VTOL Hawker-Siddeley P-1127 light reconnaissance and fighter-bomber aircraft to be offered to other European countries within the NATO framework. The agreement between the two nations is still in the preparations stage but is soon to be spelled out in detail.

Following recent talks between British Aviation Minister Peter Thorneycroft and Volkmar Hopf, deputy minister of defense of Germany, Thorneycroft noted that Britain and France are sponsoring a meeting at Strasbourg this week to discuss an international European organization for the development of rocket boosters capable of placing data-gathering payload capsules into orbit.

Limited to peaceful scientific objectives, such a system would be used for launching and testing communications, weather and navigation satellites. West Germany has announced its intention of sending scientific representatives to the Strasbourg session.

Britain and West Germany also are interested in the joint development of a mach 3 VTOL fighter which would be powered by an engine being developed through cooperation of Rolls-Royce and the MAN Company of Germany. This project would mature about 1965.

France and Italy also are cooperating with West Germany on a VTOL fighter, whereas all or some of the developments may be merged into a common NATO fighter.

ASW Center In Italy Managed By Penn. U.

Pennsylvania State University has been named to manage the Anti-submarine Warfare Research Center at La Spezia, Italy, through SIRIMAR—a non-profit organization that is the Italian contraction of International Society for Marine Research.

The laboratory was organized in 1959 with nine NATO nations contributing scientists and technical data to help solve basic problems in the antisubmarine warfare field.

Policy direction is provided by the Supreme Allied Commander Atlantic (SACLANT) in coordination with

pertinent NATO agencies. Countries participating are Canada, Denmark, France, West Germany, Italy, the Netherlands, Norway, the United Kingdom, and the United States. The Italian government has provided laboratory buildings and other facilities.

Two major operating facilities have been acquired since the laboratory was formally commissioned: a 290-foot merchant ship equipped as a seagoing research laboratory, and a large-scale digital computer.

Administrative responsibility for the laboratory was transferred to Penn State from the Raytheon Company, which initially organized and managed the center for SACLANT through SIRIMAR.

Missile Bases To Get Closed-circuit TV

Contracts have been let to supply closed-circuit television systems to four of the nation's major missile bases: Vandenberg AFB, Calif., Offutt AFB, Neb., Warren AFB, Wyo., and Fairchild AFB, Wash.

Television cameras, mounted within the Atlas intercontinental ballistic missile launch area, will observe practice operations, relaying detailed pictures to the operating crews inside the blockhouse at the launch pad.

The systems will be known as "Operation Lookout" and will provide minute scrutiny for any problems that may develop during the practice launch sequence. The cameras will be operated by remote control from the blockhouse.

The systems will be provided by Kin Tel Division of Cohu Electronics, Inc., San Diego, Calif.

Army Testing New Gas Turbine Tractor

A gas turbine powered tractor, one of the first military applications of turbine powered earthmoving and construction equipment, is currently

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Receive-only page printer in console—the same machine, but without a keyboard. For use where information need only be received, not sent. No operator is required.

Table model—with or without keyboard . . . similar model available for rack mounting.

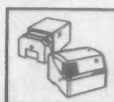
Combination set—a complete message center in one compact cabinet. In addition to page printer and keyboard, it contains facilities for preparing punched tape and for transmitting and receiving via tape.

All of these Teletype Model 28 page printers feature the Stunt Box, a built-in "programming" mechanism that will inexpensively handle a wide variety of remote control and switching tasks such as automatic station selection. All models can be supplied with sprocket-feed and tabulating mechanisms for use with multi-copy business forms. All are available, too, in a choice of cabinet colors to match office decor.

Teletype Corporation manufactures this equipment for the Bell System and others who require the utmost reliability from their data communications. Teletype equipment can be used with Data-Phone and other communications services.

Free Model 28 Line folder. Write Dept. 77-B, 5555 Touhy Avenue, Skokie, Illinois

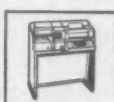
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undergoing tests at the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

The tractor is a Caterpillar Model DW-15 repowered by a GMT-305 gas turbine engine developed by General Motors Corporation. A standard rubber tired model, the tractor has been modified to accommodate the gas turbine powerplant, and will serve as a testbed for evaluating the gas turbine.

The new engine weighs approximately 600 pounds compared to the approximately 5,000 pounds for the Diesel engine originally installed in the tractor. The large weight differential, however, is offset to some extent in this installation by the weight of adapting gearboxes.

The original Diesel engine has a maximum 200 HP rating, while the gas turbine has a maximum 206 HP rating.

Skybolt Equipped B-52H Ready To Undergo Tests

An Air Force B-52H missile launching bomber, with two test models of the air launched ballistic missile Skybolt tucked under each wing, rolled out of Boeing Airplane Company's Wichita, Kansas, plant early last month ready to begin compatibility tests.

When it becomes operational several years from now, the solid fuel Douglas Skybolt can be launched from the B-52H as far as 1000 miles from multiple targets, thus making it unnecessary for the bomber to penetrate heavily defended, hostile territory. Once launched from the aircraft, the Skybolt will be able to follow a ballistic path to its target, traveling at hypersonic speeds.

Other advantages of the Skybolt include the fact that it can be "recalled" until the instant of launch; it will be ready for firing at all times from a constantly shifting missile base; and, it will be intercontinental in nature since its B-52H launching platform can be refueled in flight, enabling it to travel thousands of miles.

Representatives of the Skybolt Weapon System Program Office at Wright Air Development Division, Dayton, Ohio, stated that powered and guided launches will be made over the Atlantic Missile Range during the next few years before the air-launched ballistic missile, mated to the B-52H, would become operational.

Flying Command Post Circling The Globe

A new Air Force airborne command post/communications center, nicknamed Talking Bird, departed Seymour Johnson AFB, N.C., last month on a forty-five day, round-the-world test and evaluation flight.

ARMED FORCES MANAGEMENT

The flying command post/communications center will visit Latin America, Africa, Near East and Far East during this final phase of a five-month, testing and evaluation program being conducted for the U.S. Air Force by the Tactical Air Command. Mounted in a specially configured C-97E test aircraft, the communication facilities include single sideband radios, a telephone switchboard, portable radios for remote airfields, and a complete command post with working and living space for eight.

At various stops and while airborne around the world, the Talking Bird aircraft will test direct voice and teletype contact with the Air Force Command Post in the Pentagon and with other Air Force headquarters throughout the world. The Air Force expects the evaluation to lead to improved aircraft control in providing emergency airlift support into remote areas with poor communications facilities as the Chilean earthquake area and the Congo.

The world-wide tour of the test aircraft will be supported by two C-130s from the 839th Air Division, Sewart AFB, Tenn. Participating in the overall project with TAC are the Military Air Transport Service and the Air Materiel Command.

Navy Presses Bid For Enlarged Space Program

Navy research and development officers are supporting their bid for an enlarged space program on the premise that Navy's needs in this area are specialized—both in support of its traditional seaborne missions—and in more efficient backup of the nation's general space effort.

In submitting a list of ten major "operational requirements" involving space technology to the Senate Space Committee, the Navy argues that all of the items are "essentially different" in character than those of the Air Force, Army or NASA—or they envision new developments in the seaborne launch program the Navy is pushing.

Acknowledgement that its first Transit satellites are expensive, Navy notes that a good portion of their cost is unnecessary, largely because the 100-pound payloads eventually contemplated don't need the large boosters now used in the program. Sea-launched adaptations of NASA's Scout booster are currently being considered.

In pressing for its own weather satellite, Navy says even the elementary earth cloud-cover pictures returned by Tiros are very significant. They permit waterborne commanders to analyze and predict surface conditions essential

to fleet operations. Other satellites designed to deny enemy use of space as a weapon against naval forces are also contemplated. For instance, an enemy "fleet surveillance" satellite could be rendered ineffective by a network of "passive" orbiting vehicles designed to locate such space spies and relay the information to the fleet.

Major Strides Made In Nuclear Space Program

Major strides are being made toward defining and solving the unique operational and safety problems which will be created by the use of nuclear devices in the nation's space program, according to Lt. Col. Joseph A. Connor, Jr., chairman of the AEC's Aerospace Nuclear Safety Board. Connor summarized efforts of AEC, DOD, and NASA in assessing potential radioactivity hazards of mobile nuclear power devices and in developing safety criteria to govern their use.

Three basic safety objectives for all space nuclear devices have been developed: (1) Under the most adverse conditions, the devices must not add materially to general background atmospheric radioactivity; (2) Use of these devices at a launch pad, opera-

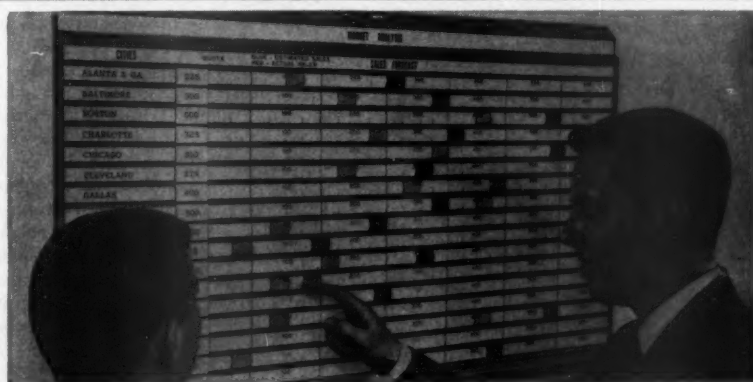
tional base, or test range must be such as to contain all harmful radiation, either within the device itself or within the prescribed exclusion area; (3) On return to earth, the devices must create no local hazard for people who might happen to be in the area. Results of studies to date indicate these objectives can be met, says Connor.

Two nuclear systems are under development for use in space: the nuclear-propelled rocket, Project Rover; and the various Space Nuclear Auxiliary Power (SNAP) units.

Aerojet Proposes Rocket Platform

A buoyant sea-base for launching large rockets or space vehicles is being proposed as a solution for future launchings into trajectories or orbits inaccessible from continental U.S. Dubbed PROP (Planetary Rocket Ocean Platform), the concept was developed by William B. Barry, senior engineer at Aerojet's Azusa, California Nuclear Propulsion Division.

Designers' drawings of the huge floating base depicted it with a nuclear rocket 40 ft. in diameter and 300 ft. long, poised and ready for firing.



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Transceivers Coordinate Vast Supply Net

Atlanta General Depot serves as switching center for southeastern United States; punched cards and transmittal machines form terminal for network which supplies paperwork for service facilities from Atlanta to New Orleans and Fort Worth.

by CWO N. C. Chavis, USA
Chief, Stock Control Division
Atlanta General Depot, Ga

AT ONE TIME the two most important words in a military vocabulary were "offense" and "defense." Today a third word has been added: Logistics.

Logistics is nothing more than the science—or art—of transporting, quartering, and supplying troops—with the emphasis on supply. In a sense, the Armed Services function as a gigantic business organization with massive problems of inventory and accounts receivable. We must provide for the two million peacetime servicemen—and be ready to supply a wartime expanded force when and if it is needed.

The National Inventory Control System—actually one of the most advanced accounting and communications systems ever devised—is seeing to it that the Services are at peak logistic strength at all times. This system provides for the supply of our current forces and insures an adequate on-hand inventory in the event of total mobilization. In addition, the inventory control system is programmed to set up all initial purchases and to handle all re-orders on an automatic basis.

The Atlanta General Depot is one cog in the national system, serving as a switching center for the southeastern part of the United States. In effect, the Atlanta Depot is a district office of this gigantic business, taking care of the supply paperwork for service facilities in Atlanta, Anniston, Redstone, Albany, Ga., Memphis, Fort Worth and New Orleans. These are our "customers" and we are as close to them as we are

to the punched cards and transmittal machines that form our end of the network.

In a sense, the codes contained in our punched cards are the strings that tie together the entire inventory control system. Once we translate written data into punched codes, the rest of the system becomes an automatic procedure. For example, when requisitions come in from our "customers" they are first audited and listed on a code sheet which shows the budget code number for the items. In other words, we are setting up the items so that they can be charged to the proper budget account.

After auditing, the code sheets and the original requisitions are forwarded to our Card Punch operators. Working from the documents these girls punch a control card and a detail card for each line item on the requisition. In short, we take our written information and put it into punched code form, so that it can be handled by our Data Processing Division, using International Business Machines Corporation data processing equipment.

With the cards created, we then move to the tub files which contain balance cards for every item maintained in our depots. These tub files are broken down by sections, with Clothing & Textile Material cards in one area, General Supplies in another, and so forth. The balance cards contained in these files show where the item is located, in what quantities and any other details necessary to efficient control of the order.

ARMED FORCES MANAGEMENT

Once the proper balance card has been located, it is offset in the file and the newly-punched item detail card placed directly behind it. This procedure is carried on through the day for all items—until just before closing time when all the offset cards are pulled. These cards are then sent to the Data Processing Division, where reproducing machines punch the special information contained in the balance card (location, etc.) into the item detail cards.

The Key Link

The next step in the system is actually the focal point of the entire operation. The key link connecting our center to the depots in the system is the Data Processing Division's IBM Data Transceiver, a device which transmits and receives detailed punched card information over ordinary telephone circuits. To inform the Philadelphia Depot of a clothing order, for instance, first we use a telephone on the Transceiver to tell the central depot how many cards we have to transmit and the tabulating machine lists totals of the amounts. This information is later used to zero balance the transmission.

The actual transmitting operation is simply a matter of processing the punched cards through the Transceiver—a machine which resembles a standard IBM Card Punch. The depot that receives the information—that is, the depot on the other end of the line—does so on a machine that punches duplicate cards. All of these operations, by the way, are carried on with a minimum of operator attendance.

The Operation

Once cards have been punched in the receiving depot, they are zero balanced on an accounting machine. This takes just a few minutes and, in event of an out-of-balance condition, the receiving depot "calls back" to tell us of the out-of-balance.

The major depots—in effect, "home offices" of our system—maintain on the magnetic tapes and drums of electronic computers all the inventory and accounting data pertaining to the items they handle. In the case of the Transceiver transmission to Philadelphia, for example, the punched cards created at the receiving end are fed into the computer. From the cards, the computer's circuits can determine how many of the item to add or subtract from inventory, where the item is going, what budget account it should be charged to, and all other factors concerning the requisition.

Once the computer has been fed the necessary data, a new balance card is created. This new card actually serves a number of purposes: It is used by the central depot as a billing document, charging off the items ordered against the proper account.

The new cards are duplicated to form an accounts receivable file.

Finally, the cards are put on Transceivers to send new balance cards to the sectional depots. These are taken from the machine and deposited in the tub file in place of the old balance card.

In another operation, engineering material information is sent to the Columbus, Ohio, "home office" via the Transceiver network. Data goes there not only from our Atlanta General Depot, but from similar "district offices" all over the country. The Transceiver network includes overseas locations as well.

One Control Point

The basic concept behind the National Inventory Control System is the establishment of one control point for each class of items. This means that the Philadelphia Depot has all the facts relating to clothing supplies right at its fingertips, in the form of data stored in its computer. In this way, the central office can order transshipments

between sub-depots to meet special needs; it can re-order when supplies fall below a predetermined minimum point; it can keep careful control over disbursements; and in general, can see to it that the supply picture stays favorable under all conditions.

The Net Result

As far as the actual shipment is concerned, the original card used to transmit the data becomes the shipping authorization. The important point to remember in all this, however, is the time element. We can receive the requisition, convert to punch cards, transmit and instigate shipping all within a matter of hours. In practice, once the information is in card form the rest of the procedure is a rapid, automatic process. Our next objective, to be implemented in the near future, is to receive the requisition—or order—in punched card form rather than hard copy.

The net result of the National Inventory Control System is centralized management of supply. By concentrating billing in one office, for example, we have been able to reduce billing time—once five-to-nine months—to just 45 days.

In short, from the vital standpoint of logistics, the Armed Services are second to none.

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Newsletter

Armed Forces Management Association

Washington 25, D.C. Phone: OTis 4-7193

National President: Hon. George H. Roderick

Exec. Vice Pres.: VAdm. Harry E. Sears, USN, ret.

Changing the Guard

AFMA takes this opportunity to salute our new Commander-in-Chief, and the capable team of dedicated Americans which he has chosen to assist him in the world's Number One management job—that of directing, safeguarding and improving the United States of America—and through her, leading the free nations of the world in the desperate struggle against the Communist conspiracy. We pledge our full support to this young, enthusiastic and vital group, many of whom we have known before in civilian occupations or former government service. Robert S. McNamara, our new Secretary of Defense, for example, recently headed one of AFMA's longtime and valued corporate members, a company that has contributed much to the furtherance of AFMA objectives. His deputy, Roswell L. Gilpatric, is no stranger to Defense, and we welcome him back to a more responsible position. Also, our new Secretary of the Air Force, Eugene M. Zuckert. The new Civil Service Commissioner, John W. Macy, Jr., likewise is not new to our group, having played a prominent part in our national conference in 1959 (see vol. 1, no. 8, THE JOURNAL).

With the affairs of our nation, particularly those pertaining to the defense establishment, in the hands of men of such demonstrated capability, we look forward with confidence to our days ahead, together in pursuit of more efficient, effective and economical employment of our national defense resources. We are fully confident that they in turn, as have their predecessors through the years, will lend us their interest and support. As we have repeatedly said in the past, it is becoming increasingly apparent that nothing but the best in the management of our national defense resources will suffice if our country and our way of life are to survive in the troubled days ahead.

We likewise take this opportunity to express what we know is our country's gratitude to those who have or are about to leave positions of responsibility in Defense. Many have served for long periods, usually at considerable personal sacrifice. All have been dedicated in the performance of their thankless tasks and have contributed to the evolutionary process of developing a better Defense. They leave, we are sure, with a thought (which we share) that, with a task of such magnitude and complexity, it will be many, many years before a streamlined, economical and fully responsive defense establishment can be realized. They leave with our profound admiration and respect for the service they have performed, and our warm appreciation for their interest in and wonderful support of the AFMA program—without which we could not have realized our present growth and stature.

The Task We Face

We are happy and a bit proud of the great emphasis which the new administration is placing on the need for improved management. This has been the AFMA theme since our birth; this is our reason for being. Some weeks ago, *The Washington Post's* Federal Diary (by Jerry Klutetz), stated that "... Mr. Kennedy has shown a surprisingly keen interest in the need for good management in Government, and has stressed the need for improved man-

agement to all of his major appointees." It went on to observe that "The President-elect has directed David Bell, his Budget Director, to draft a positive and vigorous program to improve management throughout the entire Federal Service."

Such a directive is clear-cut, and of great significance to AFMA. With the increased emphasis the new administration is attaching to the need for management improvement in our government, it should be quite apparent to the membership and prospective members that AFMA and its objectives assume added importance. This is a mandate that we all can, and should, do something about, for in the doing we will further develop our organization and the service it renders our country.

In this connection, we are happy to report that for some months AFMA (the only national organization so honored) has been working closely with the Bureau of the Budget in the development of a management improvement program for the Federal Government—along the lines recently directed by the President. We shall continue to assist in this and similar programs in the defense establishment whenever possible.

The National Conference

As we go to press, the Association's Seventh National Conference is less than a month away. A tremendous amount of effort on the part of many dedicated people has been expended to make this the best and most valuable of such meetings to date. Every AFMA chapter should make a concerted effort to have a good representation at this most important meeting. The three Washington chapters should attend en masse. The speakers will be of national reputation, and the chapters will play a much more active part in the proceedings than heretofore. This fact, and the management knowledge and lessons which attendees will be able to take back to their home installations, is more than sufficient justification for people in the field to attend this meeting (we feel) under travel authorization.

Response from our Corporate Members in the form of speakers, exhibits, registrations and banquet reservations has been highly gratifying. We are fortunate indeed in having so many of the nation's top industrial concerns in our family. A large attendance from the membership will be a fine reward to our industry participants who are doing so much to make the conference successful. *Get your registration in now*—pay later if you like—but get it in. By so doing you will save a last minute rush and assist our busy staff. Hotel reservations should be requested at the same time—we have special rates at the Shoreham. Don't forget the dates: 28 February through 2 March. Reception and fellowship-get-together at the Army-Navy (Town) Club the first evening; Awards Banquet at Bolling Air Force Base Officers' Club the night of 1 March. This is the highlight of the meeting, and always is a lot of fun with fellowship, entertainment, an excellent speaker and presentation of awards to individuals and chapters who have helped AFMA help our country. Plan now to attend. Bring your wife (no registration fee for spouses accompanying registered members in any events). Help to make The Big Event of your Association a complete success, while seeing your friends and improving your knowledge.

The Fourteen Erroneous Postulates

by Leland B. Kuhre, Col., USA (Ret.)

Founder and Director
The Academy of Organizational Science

13--An organization is formed by evolution.

THE PREVALENT literature on organization reveals a tacit belief (postulate) that 'evolution' causes an organization to grow, and that growth causes functions to emerge, evolve, or atrophy. One consequent: the expensive belief that 'reorganizations' from time to time are normal—necessitated by growth.

The word 'Evolution' (Latin, *evolvere*, to unroll, to roll forth) was given currency in modern literature by seventeenth-century philosophers. They employed it to describe the unrolling, as of a scroll, of vast records of Time.

But the postulate comes from a special case of Evolution: the doctrine known as Darwinism. This is evident from the frequent reference to "natural selection," "survival of the fittest," "struggle for existence," and sociology's "conflict" as active and directive agents—Greek gods of destiny—shaping events and forming organizations.

Generally in unawareness, organizational thinking is shaped by still-moving ripples from the thought-wave stated by Darwin's *Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (1859). [Darwin did not know of Mendel's unnoticed work (1857-69) that, after its discovery in 1900 by Correns, de Vries and Tschermak-Seysenegg, started a rising science of genetics and a waning belief in "natural selection."]

People believed they saw implications of Darwinism in every department of the inorganic and organic world, in the structure of human society, and in the human mind. Herbert Spencer (1820-1903) devoted his life to formulating a philosophical system around his theory of evolution by "Survival of the Fittest (1864)" as a process of producing higher from lower forms. Spencer taught that evolution proceeds according to fixed, ineluctable laws, that planning and control are impossible, and that interference usually makes things worse.

Now Charles Singer finds: "That the philosophical system of Spencer is an object of derision is one of the few points on which all philosophers seem now to agree." (*A Short History of Scientific Ideas*, Oxford U. Press, '59).

To organize and conduct collective human work from a postulate that evolution causes growth and growth evolves functions has no basis in man's accumulated knowledge, not even by analogy or in metaphor. Darwin described his view of the evolution of species or races over the ages, not the growth of organisms (organizations) from seed-cell to full organic structure within a lifetime. In biology this growth is *epigenetic development*, not evolution.

In *Atorogenics*, man creates the *Mechos*—the organic structure for collective human work—by decision-generation. From a seed-decision, we generate decisions (each issues from a preceding) in index-number-relations as members of the serial order 1,2,3, . . . n. Decisions have definite who-what-where-when-how-why structures; they each are nuclei of (contract) organs that persons use in working in accordance with the organiza-

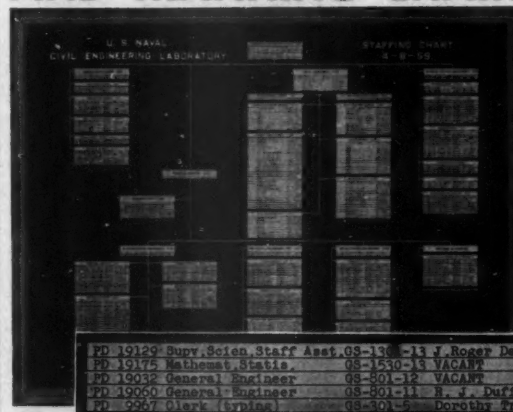
tion-conception which began developing 2,000 years ago.

A natural metaphor for decision-generation in developing the *Mechos* is cell-generation in developing the organism. Before actual development begins—in the creation of an organism (organization of living organs), or a gas engine (organization of mechanical organs), or a *Mechos* (organization of contract-organs)—there is foreknowledge of the ordered development to the full-grown structure of requisite organs—self-acting, connected, and harmonious in working together. 'Reorganization' is abnormal—recovery from preventable miscarriage—wasteful.

Thus in genuine organizations there can be no "evolution" of functions by "natural selection," "survival of the fittest," "struggle for existence," or "conflict." The postulate is erroneous. To make the postulate valid, delete "formed by evolution" and insert "developed by decision-generation."

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14--An organization is portrayed by an organization chart.

The word 'organization' generally calls to mind a picture of a chart—a ladder-like arrangement of line-connected rows of rectangles. Each rectangle contains words that are supposed to give a viewer the idea of a person or group using mental and material energy in making or doing something. However, the typical chart indicates no thing—mental or material—leaving each rectangle for a needed effect on something being made or done in other rectangles.

From the top rectangle, lines go to rectangles in the row below; there most of the lines are dead-end while the others go on to rectangles in the next row below. And so on down the rows to the bottom row.

Sometimes there is a legend to explain lines (solid, broken, dotted, etc.) for different kinds of authority-relations between line-connected rectangles.

Let us cut a chart into a pile of individual rectangles and line-segments—as though making a jig-saw puzzle—and then ask a person to reconstruct it. He finds that a rectangle's symbolic meaning and enclosed words do not establish its unique location with respect to adjacent rectangles or with

respect to a reference point or datum common to all rectangles. Hence, reconstruction by fitting or by reason is impossible.

The conception portrayed by the chart is not the organization-conception that has been developing for over 2,000 years from the (Greek) *organon*-concept, something used in working; to the (English) *organ*-concept, instrument (1548); to the (1664) *organism*-conception, a structure of self-acting organs so constituted that the functioning of the organs and their relation to one another is governed by their relation to the whole, and so that every organ is at once a means and an end to every other; and to the (1790) *organization*-conception and an artificial organism, e.g., the steam engine of mechanical organs. The last two conceptions have dynamic charts that portray how the organs, each unique, work together.

In comparison, the typical 'chart' for collective human work is merely a decreed, static arrangement of authority-connected fenced-in names of persons, positions, specialties, and activities. Therefore the postulate is erroneous.

Before we can have an organization chart, we must have an organization-conception, and this requires constituent (contract) organs with index-numbers in a set of number-relations generated from prime organ and having a concrete datum.

To reflect the prevailing situation, the postulate should read: "So-called organization is portrayed by an arrangement-chart."

We have exposed errors in fourteen prevalent erroneous postulates. There are more. And there are sayings, saws, maxims, and proverbs—half-truths—so-called principles of organization and management for the entity of collective human work.

Anyone's surveillance of the whole of prevalent literature, schools, and reported practice of organization-administration-management shows a profusion and confusion of ideas. The reason is apparent when we look at the twentieth century as a stage in over twenty centuries of advancing thought. Several lines of developing thought converge and pour ideas into the stage as a crucible in which one incongruity generates heat. The seething ideas give off stifling vapors of fear, resentment, uncertainty, and waste.

The series of "The Fourteen Erroneous Postulates" was introduced by Col. Kuhre in the January 1960 edition of *Armed Forces Management* and continued on a month-to-month basis throughout the year.

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